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COMPUTERWORLD

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Minot Daily News

Preparing for the Worst

MINOT, N.D. — The battle of man vs. the elements resumed here for the fifth time in seven years as 35 miles of dikes were built to protect this city from the swelling Souris River. Thousands of residents, along with a large DP center, were forced to evacuate. See story on Page 4.

NEWS PAPER

Most Private-Line Users to Pay More If FCC Accepts AT&T Hi/Lo Replacement

By Ronald A. Frank

Of the CW Staff

WASHINGTON, D.C. — AT&T has proposed new rates that would raise monthly rates for about 75% of its 20,000 private-line customers.

Called Multi-Schedule Private Line service, the proposed rates were filed in response to an order by the Federal Communications Commission (FCC).

The FCC order found that Bell's Hi density/Lo density charges were not economically justified, and the FCC told AT&T to come up with a new pricing scheme for its private-line services.

The proposed Multi-Schedule service is based on two categories of cities. A Category A city is one in which the phone company has a private-line capacity of at least two master groups.

This means a city where Bell can terminate 1,200 private-line channels; there are 379 such cities under the proposed rates.

All other cities or rate centers which have less channel capacity will be designated as Category B cities. Within this framework, AT&T has established three

tariff schedules.

Schedule I covers charges between Category A cities; Schedule II covers rates between Category A and Category B cities; and Schedule III covers rates between Category B cities.

All rates are distance-sensitive.

Schedule I rates for a 15-mile circuit would be \$76.20 plus \$1.80/mile over

one mile or \$101.40/mo. Under Schedule II, the same circuit would cost \$98.20 plus \$3.30/mile over one mile or \$144.40/mo.

Using Schedule III, the same circuit would be \$114.60 plus \$4.40/mile over one mile or \$176.20/mo.

AT&T estimated 25% of the private-line

(Continued on Page 3)

Programmers May Balk

Measurement Seen Sparking Resistance

By Ronald A. Frank

Of the CW Staff

CHICAGO — The start of a performance measurement program means that people's toes are going to get stepped on, according to Richard Anders, head of the measurement group at the Federal Reserve Bank here.

A performance measurement group should report only "to the toughest guy

in the shop," such as the DP manager, Anders told a Computer Caravan session recently.

When measuring starts, there are no longer any secrets — and some programmers will feel compelled to refute the data just to save face, he said.

Anders described the benefits achieved by his DP center as a result of installing performance measurement software last January. The bank selected the Configuration Utilization Evaluator (CUE) and Data Set Optimizer (DSO) from Boole & Babbage, Inc., and some significant improvements have resulted, Anders said.

The software was installed on dual IBM 370/1455 running under the VSI operating system. The CUE software took up about 28K of virtual storage and cost about \$20,000, Anders said.

While it has been upgraded with about 10 fixes provided by the vendor since it was first installed, on the whole the software is "fairly stable," Anders said.

After a general system profile of the dual 370s was generated, and potential bottleneck areas were identified, improvements were made in five specific areas, Anders said.

CPU utilization was reduced from 95.68% to 88.75% for the same workload; the paging rate decreased from 14.55 sec before the measurement effort to 9.21 sec; and the average time per page was reduced from 102.60 msec to 16.24

has on order and sitting in a warehouse [CW, April 12] "will represent an increase of more than 40% in large-scale computer capacity at SSA" if they are allowed to be installed, according to the programmer, Ferdinand Jung.

Jung has raised the question of the efficiency of the SSA computer operation to the administration's Bureau of Data Processing Management for the last two years [CW, Jan. 26].

The GAO has submitted the preliminary draft of its audit to SSA and the administration's management is studying and commenting on its findings. Once this standard GAO procedure is completed, the GAO study will be finalized and its full results released to the public, Jung anticipates.

In a letter dated April 15 and addressed to various congressional committees and to the commissioner of SSA, Jung stressed once again his concern that the SSA's current plans to expand its computer operation would be "a flagrant waste of taxpayers' money."

Jung included in this "waste" the four 370/168s awaiting installation following the completion of a \$2.3 million temporary computer facility; the construc-

(Continued on Page 2)

DG Cobol Compiler for Eclipse Meets ANS '74 Specifications

By Don Leavitt

Of the CW Staff

SOUTHBORO, Mass. — Data General Corp. (DG) has introduced its first mini-computer Cobol compiler. The compiler runs only on the Eclipse C/300 system and is an implementation of American National Standard (ANS) Cobol '74.

The Cobol reportedly has capabilities found on major mainframes and was designed for data entry and file inquiry applications, a spokesman said.

There is a high degree of language compatibility with application programs written on large CPUs, he added.

Designed to run under DG's RDOS, the compiler provides a "full interface" with Infos, the company's data base-oriented

file management system, and a CALL-level interface with Communications Access Management (CAM) software. The links to Infos are based on the compiler's utilization of the Eclipse C/300 commercial instruction set, the company said.

Rdos supports dual foreground/background processing and Cobol can be used in either mode regardless of what is being done in the other. CAM provides support for local and remote synchronous terminals from the Cobol program.

With CAM available, DG's Cobol implementors didn't include the Communications module of ANS Cobol '74. Again, possibly because the Eclipse line already has RPG-II, the Cobol Report Writer is

(Continued on Page 4)

msec, Anders said.

Deactivation of individual partitions because of thrashing had been 41.2%, but this dropped to 3.82% after the measure-

CW Special Report on Optimizing DP Operations follows Page 36.

ment data had been collected. And SVC loads had been 120.17 sec, but were reduced to 11.24 sec, he said.

Part of the improvement in paging time was the result of replacing 3330 disks with 3305s, he said. In addition, the disk subsystems were restructured among the four available multiplexer channels, based on the measurement data.

Reorganization of the system packs and data packs cut down on head movement, increased throughput on the channels and reduced device contention, Anders said.

Other software changes implemented by the bank included the use of Applied Data Research, Inc.'s Metacobol to scan the source code of application programs for inefficient programming and the installation of a Cobol compiler from Computer Linguistics, Inc. (CLI).

The independent compiler replaced the IBM Version 4 Cobol compiler and resulted in an improvement of about 25% in object code average times, he said.

The CLI compiler did require some

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THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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No NCIC Check Made**Man Held on Canceled Warrant Kills Self**

By Nancy French

Of the CW Staff

YONKERS, N.Y. — A 20-year-old man who was arrested and held on a five-month-old warrant hung himself in a cell at the city jail here the same night.

Had Yonkers police officers consulted either the state's computerized criminal justice information system or the National Crime Information Center (NCIC) before detaining Steven Karagianis, they would have learned the warrant had been canceled nearly a month earlier.

Karagianis was stopped in his automobile at about midnight on April 7 by two police officers who had a warrant for his arrest. The warrant cited a probation violation and was dated Nov. 30, 1975, according to attorney Jeremiah Gutman.

Taken to the Yonkers Police Station, Karagianis called his mother. He was "very upset," Muriel Karagianis said.

Sometime soon after, the youth was found hanging by his trousers from his cell door. His parents were informed at about 4 a.m. by police officers and a priest who came to their home.

Karagianis's brief 20 years were not easy ones. A poor reader and deaf in one ear, he dropped out of high school after his freshman year. He enlisted in the Navy, but was honorably discharged due to an apparent learning disability. A year and a half ago, Karagianis was arrested on a minor marijuana violation, according to Gutman. His penalty for the offense was five years' probation.

Then, on Nov. 30, the youth was picked up "in a car in which there were several marijuana cigarettes and charged with violating his probation," Gutman said.

Karagianis appeared in Westchester County Court on Jan. 14, at which time Judge Issac Rubin dismissed the charge and the youth "went about his business," Gutman explained.

At that time, the warrant should have been canceled.

Notified of the incident by the young man's parents, Gutman wrote a letter to the Sheriff's Office on March 5, and the Westchester Sheriff's Department recalled the warrant two days later, Gutman said.

A spokesman for the Sheriff's Department said the warrant was actually can-

canceled on March 9. A cancellation notice was teletyped to New York State Criminal Justice Services, the Federal Bureau of Investigation's NCIC in Washington, D.C., and all police departments.

Yonkers would have gotten the cancellation notice on March 9, the spokesman said.

Lt. Joseph Nader of the Yonkers Police Department refused to comment on the case pending the outcome of an "internal investigation."

Nader did say, however, that as a rule, when a message is received canceling a warrant, "we rip that message off and call down to our warrants squad to tell it the warrant has been canceled.

"Then we return the warrant and a copy of the cancellation message is filed here to indicate that the warrant was cleared

on such and such a date," he said.

Nader's superiors would not provide any additional information, even from the department's procedures rule book.

No Warrant Found

A spokeswoman for New York State Criminal Justice Services confirmed a routine check of the system on April 4 did not locate a warrant for Karagianis.

She added further that "our Identification and Information Services [Unit] checked NCIC too and, as of yesterday, a 'CW' filed March 9 was in front of his name." CW stands for "cleared wanted."

The record, with the accompanying code and the date it was entered, stays in the file a minimum of 30 days. Then the entire record is purged with the next automatic purge, which is run every alternate Monday, an NCIC official explained.

GAO Audit of SSA DP Operation Finds Only 40% of CPUs Utilized

(Continued from Page 1)

tion of an office building in the city of Baltimore, known as Metro West, at an estimated cost of \$92 million; and the building of a computer center building in Woodlawn, Md., at a cost of \$69 million.

Congress has given approval to all these plans.

The programmer has contested the building of the computer center and the temporary facility and has questioned the need for the four warehoused computers.

And, given a statement by the SSA's associate commissioner for management and administration before the House Subcommittee on Public Buildings and Grounds on March 26 that if the SSA could have only one building it would "fight like the dickens for" the computer facility in Woodlawn, Jung questioned the justification for Metro West as well.

"In the interest of saving many tens, if not hundreds, of millions of taxpayers' dollars . . . I ask each of you to do whatever is necessary to withdraw the previously given approval for the construction

of the computer center building," Jung wrote in his letter.

Long concerned with the efficiency of SSA's computer center operation, Jung was put on special assignment by the administration last fall to substantiate his claims that SSA's current computer capacity is more than adequate to handle the administration's needs.

Failing to obtain what he felt was an adequate hearing of his findings within the SSA's Bureau of Data Processing Management after numerous attempts, he went to the GAO and to congressional committees with his results.

Jung is confident the GAO report's full results will support his findings and contentions over the last several months. The SSA management is equally confident the GAO's audit will buttress its claims of need for more space and increased computer power.

A spokesman for the GAO has stressed the agency's audit has been an independent one. There is no specific date for the report's release as yet.

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Industry Experts Doubt FCC Acceptance of AT&T Rates

By Ronald A. Frank
Of the CW Staff

Some industry experts expressed doubt last week that the Federal Communications Commission (FCC) will accept AT&T's new Multi-Schedule rate concept. "The economic proof that Bell submitted earlier is that Hi density routes

cost more than Lo density routes. So what is the difference between Hi density routes and Category A cities?" an MCI spokesman asked.

The tariff proposal is an attempt by AT&T to leave the current rate structure in effect for some time despite FCC objections, he said.

Bell Rate Proposal Could Hurt 75% of Private-Line Customers

(Continued from Page 1)
users would pay about the same monthly bill or receive reductions under the proposed rates.

Long-distance rates would be reduced, with a New York to San Francisco circuit (Category A to A) priced at \$1,444/mo.

Present rates under the existing Hi/Lo tariff are \$2,488/mo for the same circuit.

Short-haul rates would increase. A circuit between New York and Newark, which under Hi/Lo cost \$87.50/mo, would cost \$117.20/mo under the proposed tariff, an AT&T spokesman said.

The new rates are based on the premise that Category A cities with high-capacity facilities have a lower per circuit cost to provide service, an AT&T spokesman said.

This concept bears many similarities with the Hi density rates which were lower, AT&T said, because there was higher customer usage in these areas.

In addition to mileage charges, station terminal rates would cost \$25/mo for stations that can be automatically accessed. A manual switch is available to access a second station at the same site; in this case, the second station cost will be \$5/mo.

Installation for all station arrangements for data service will be a one-time charge of \$54.15.

For multipoint service, each individual link in a network will be priced separately, according to the applicable price

NSF Decides to Fund DP Survey of Colleges

ROLLA, Mo. — The National Science Foundation (NSF) has awarded a grant to Dr. John W. Hamblen, chairman of the Computer Sciences Department at the University of Missouri here, to conduct an inventory of computer activities and related degree programs in U.S. higher education.

This is in contrast to a report that no funds were appropriated for an inventory of computing activities in higher education during 1975 [CW, Dec. 31-Jan. 5].

The inventory is to include figures of expenditures, staffing, hardware and utilization of computer systems in colleges and universities throughout the U.S., according to Hamblen.

The base year for the survey will be 1975-1976.

The project will culminate in "an exhaustive and authoritative report" on computing activities in higher education.

This edition will consist of two volumes. The first volume will be patterned after the two previous inventories, published by NSF and made available through the U.S. Government Printing Office; the second volume will be an interpretive report, Hamblen said.

Some of the topics to be considered for chapters are type of institutions, administration, research, instruction, kinds of equipment, networks and special resources, manpower production and utilization, and finance, he said.

A conference will be held at NSF in Washington, D.C. this fall to discuss changes in the data items, he noted.

The proposed rates will lower monthly costs for the largest private-line users because they are the ones that also operate over the longest distances, according to a spokesman at the Center for Communications Management, Inc., a consulting firm in Ramsey, N.J.

Increases of 92%

But the 15,000 small businesses that operate interstate private lines of less than 25 miles will be hit with increases up to 92%. As an example, rates along former Hi density routes will be reduced 42% on coast-to-coast circuits. Former Lo density routes over 80 miles will also be reduced.

A 500-mile Lo density circuit under Schedule II would have more than a 60% reduction, the spokesman said. The center has available a report analyzing the proposed AT&T changes.

It is expected the specialized carriers

will have to drop their rates if the FCC approves the Multi-Schedule service. The specialized carriers have characteristically kept their prices about 10% below those of the phone company, according to one industry source.

At distances over 300 miles, however, AT&T's new rates will impact this 10% price difference, and it is expected the specialized carriers will reduce their rates as a result, he said.

Narrows Cost Margin

The proposed rates will also narrow the cost margin between terrestrial private lines and satellite circuits. The proposed tariff leaves only about \$400/mo difference between the two.

It is believed some users would rather pay this added cost so they can operate on more conventional land lines, the industry source said.

ADR SOFTWARE HELPS LEEDS & NORTHRUP MAKE SENSE OUT OF THE ENVIRONMENT.

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JCL errors have also been markedly reduced. Instead of filling out lengthy JCL cards, keypunching and waiting up to four hours to get cards into the system, the programmer just sits at a ROSCOE supported remote terminal and keys in requested information shown on the CRT display. JCL is in the system in three minutes or less. If an error is made, the programmer knows about it immediately and can correct it on the spot.

ROSCOE's direct access conversational data entry features give the sequence of information that is needed automatically. What's more, the information goes directly to the system without stops and delays usually associated with manual data entry.

Joe Dupon, Manager of Computer Technology, credits these features with many dramatic savings in time and increases in efficiency through reduced coding and programmer keying time, reduction of manual operations, less waiting for data entry, fewer chances for error, and reduction of error correction time.

Other ADR software that Leeds & Northrup has installed includes The Librarian® and MetaCOBOL®.

The Librarian safeguards the maintenance and retrieval of application programs. MetaCOBOL was used to convert from DOS ANS Cobol to OS ANS Cobol in less than half the time Joe Dupon estimated it would take.

According to Joe Dupon, "an important point about ADR's software products—ROSCOE™, LIBRARIAN and MetaCOBOL—is that they have always worked to specifications."

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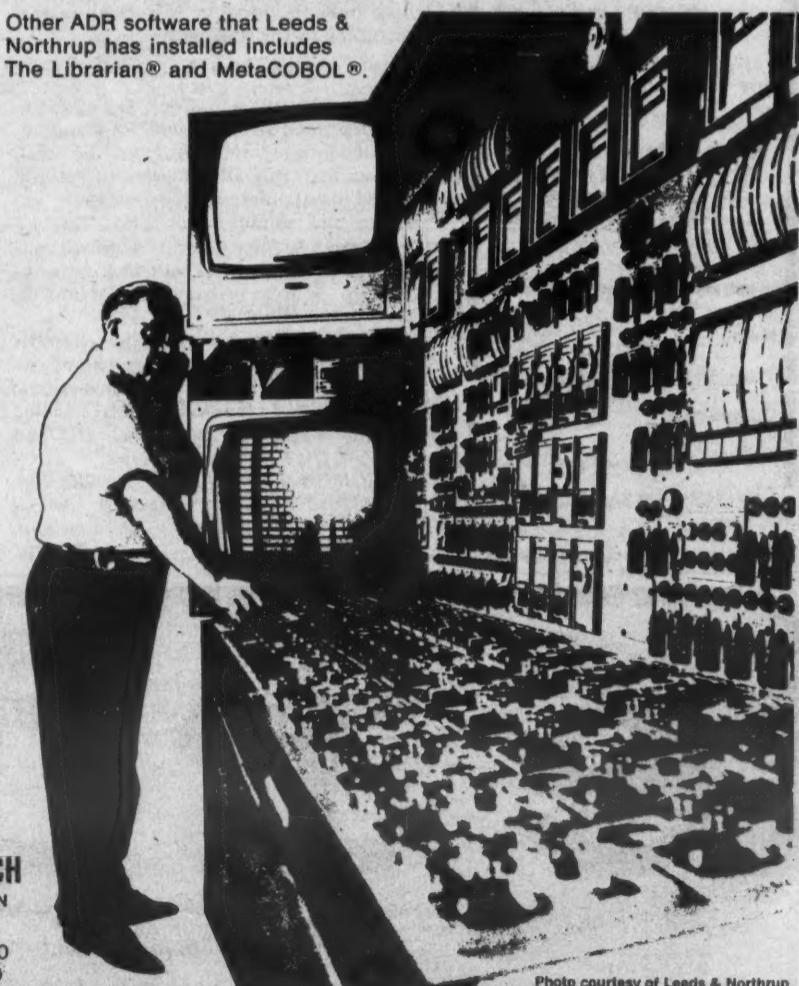


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Site Moved for Third Time

By Nancy French

Of the CW Staff

MINOT, N.D. — For the third year in a row, Westland Oil Co. here decided it had better move more than its computer system when the flooding Souris River threatened to inundate one-third of this city.

So, in an overnight move that disrupted operation of the firm's IBM 370/115 for only 28 hours, Westland moved its entire business.

Although the precaution later proved to be unnecessary, staying would have meant risking an estimated six feet of water in the firm's computer installation. It was a chance the company didn't want to take, DP Manager Eugene Behrens explained last week.

Perched high above its usual downtown location in quarters that once housed the defunct Minot Business College, Behrens said "we're in a better site than we have on East Central Street — and a far better spot than the tire warehouse we moved into when the Souris flooded two years ago."

But this year the company may stay on higher ground; Behrens thinks his management in Calgary, Alta., across the Canadian border, has finally realized something permanent has to be done.

Between heavy rains that pelted the

town and runoff from upriver farms, the river had swollen nearly 50% more than it did last year, Behrens said. For the first time, DP staff members had to evacuate the families of six co-workers before moving the entire business, he said.

Temporary Quarters Established

"It's not easy to find temporary quarters in a small town like Minot — there just aren't that many vacant buildings," he said.

"We found this place on a Saturday morning and got an OK to rent it about 5:00 that afternoon," he said.

Then, while gravel trucks and bulldozers worked round the clock reinforcing some 35 miles of dikes to save as much of the town as possible, Behrens was busy ordering air conditioning units, power lines and new phones — all of which were installed within three days.

The firm did not install a raised floor since the move may be temporary. In previous years, it has been displaced no more than three to four weeks, he said.

Tuesday evening the computer was torn down and moved. It was a five-hour job for IBM servicemen from Bismarck, about 120 miles away, he said. At 8 a.m. Wednesday, they began reassembling the

system in the new location and, by 6:30 p.m., the system was live again, Behrens said.

In addition to installing new power lines and air conditioning, Westland had to move office equipment and furniture for 75 employees.

Added to that burden, Westland's leased line from here to Calgary had to be reinstalled so on-line teleprocessing services for headquarters operations could continue.

Westland's Minot division does all computer processing for the \$300 million firm which consists of a chain of gasoline stations, propane and home heating oil distributors and a steel pipe manufacturing company in Denver. That includes payroll checks for 3,000 employees and about 75,000 accounts receivable.

An IBM 3780 system in Westland's Calgary headquarters preprocesses and feeds data for processing in Minot via the leased line. In Montreal and Denver, Honeywell H901A remote job entry systems process data and batch transmit it to Minot via dial-up lines, Behrens explained.

The DP department runs three shifts six days a week.

Interrupting service to move cost the

firm between \$80,000 and \$100,000 this year, and moves get harder and harder as the company continues to grow, Behrens said.

The Souris has been a problem since about 1882, but before 1969 it had overflowed only three times in 77 years. Since that time, however, the Souris has approached flood levels five times.

Permanent Solution

The Burlington Dam, proposed at a site 24 miles from Minot, would solve the town's flooding problems permanently.

At present, however, farmers who don't want to lose their land and environmentalists who object to flooding a nearby wildlife refuge have opposed it. Even if work started today, that dam wouldn't be completed until 1984, officials said.

The Army Corps of Engineers dug a deep channel in the river bed last summer as a temporary solution, but this year's extra heavy runoff negated their work.

About 13,000 of the town's 33,000 residents were evacuated from their homes, and last week "the town [was] full of congressmen and senators," Behrens said. Everyone watched the river crest and recede. They had made it through another spring.

DG Cobol Compiler for Mini Meets ANS Specs

(Continued from Page 1)

not part of this compiler system either. But all of the other functional modules in the ANS Cobol '74 specifications appear to be present.

Program development tools built into the system include the Debug module, English-language error diagnostics and a cross-referenced source-listing facility, each of which should speed program preparation time and reduce debugging time once the program is initially coded, according to the spokesman.

Interactive Debugger

Unlike the batch-oriented Debug facilities described in the Cobol '74 standard, DG's debugger is interactive, he said, noting that this allows users to set and cancel breakpoints and dynamically examine and modify data items. Beyond that, this compiler supports standard card and free-format input, allowing users to prepare source programs at terminals, using text editors.

The Cobol interface to Infos supports four different file organizations and access methods. These include conventional sequential and random methods, handled by the compiler's Sequential I/O and Relative I/O functional modules.

The Indexed I/O module provides support for Indexed Sequential Access Method (Isam) files, the spokesman said. Isam separates the hierarchical index file,

which contains the record keys, from the data base files. A search can be done completely within the index file without the "chase" through the data file required by "most systems," the spokesman added.

The Data Base Access Method (Dbam), a compatible extension of Isam, provides a data base inversion capability that allows records to be accessed through multiple index files.

While that "eliminates" data duplication, a multilevel indexing feature supports data structures requiring data base access through logically related keys, the company said.

Dbam also allows part of a data base record to be stored in the index file as a partial record, so frequently used data

(Continued from Page 1)

"minor syntactical changes," but these were not serious, he added.

Anders cautioned those users considering the use of measurement tools that there is a tendency to measure everything. Instead, specific problem areas should be identified and regular system profiles generated; in this way, an operating history can be compiled, he explained.

Users should concentrate on making improvements to obvious problems. The subtle areas which users often try to

can be retrieved without a full data base access, the spokesman added.

Cobol is available only on the C/300 with 128K bytes of main memory, a real-time clock, 10M bytes of disk storage, a 9-track magnetic tape and a system console.

The compiler system with installation support and a year of the Software Subscription Service — covering corrections, modifications and enhancements — is available for \$7,000, with delivery 90 days after receipt of order. Second sites, without support, are \$5,000, but discount plans for multiple-site installations are also available.

DG's corporate office is on Route 9 in Southboro, Mass. 01772.

Measurement May Be Resisted

(Continued from Page 1)

identify by carefully studying the measurement parameters usually are not worth the effort: "If you lived with these all along, they may not be worth improving," Anders said.

20% of Effort

With measurement tools, 80% of the benefits is usually the result of 20% of the effort. And it may not be worthwhile to work to get the other 20% in benefits because of the diminishing returns, he concluded.

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SyncSort users of the world, we love you! May your tribe ever increase.

Survey Made by Nasis Finds

Lack of Support Creates States' Biggest DP Headache

By Nancy French
Of the CW Staff

LEXINGTON, Ky. — Lack of support and understanding from management on the outside and programming difficulties on the inside created state agencies' largest DP headache last year.

Cost overruns ranked second, according to a report from the National Association of State Information Systems (Nasis) based on a 50-state survey.

States also reported that despite a firmly established pattern of central control of hardware acquisition, the number of computer systems kept growing.

Furthermore, leasing, which has been the most common method of acquiring computers, fell off — especially for large systems, where the number of leased systems dropped from 60% in 1974 to 49% in 1975.

In addition, hardware continued to decrease as a percentage of the states' total information system budgets, with hardware consuming 35% of the DP budgets in 1975 compared with 37% in 1974.

In the area of software transferability, which has received much attention in recent years, the report showed only 48 transfer projects under way or completed in 1975 — about the same number as in 1974.

Efforts to improve privacy and security showed little improvement in 1975, with state legislatures defeating 13 out of 14 bills introduced, Nasis found.

Problem Since '72

In the area of "external" problems — those over which DP managers have no control — 37 states ranked management understanding and commitment as their

number one problem. This has been reported as the most serious problem since 1972.

Lack of a definitive plan dropped to third place in the minds of DP managers from 39 states.

As for "internal" problems, missed pro-

sion can be materially reduced by formal, written procurement procedures, Nasis said. Thirty-eight states reported such procedures for hardware procurement, 35 for software and 37 for contractual services.

Standardized documentation increases

'75 Salaries Show Wide Range

LEXINGTON, Ky. — Top management in state DP organizations earned \$18,000 to \$33,600 last year; systems analysts pulled down \$11,500 to \$23,500, according to a recently published state survey.

Fifty state governments spent nearly \$350 million in 1975 employing about 43,000 individuals in information systems functions, the National Association of State Information Systems (Nasis) said in its annual report.

Management was broken down into three levels by the report. First-level management personnel earned annual salaries ranging from \$10,800 to \$25,000, while second-level management were paid \$14,000 to \$32,000, Nasis found.

gramming schedules was ranked first by 37 states and has been since 1973, when 35 ranked it number one. Cost overruns and too-high costs were the next most serious concerns, according to 35 and 36 states respectively.

It appears economic conditions had a strong impact on the situation because cost problems moved from seventh place in 1973 to third place in 1975, Nasis said.

More Long-Range Plans

The Nasis survey showed 31 states had developed a long-range information system plan, compared with 28 in 1974 and only 18 of 47 states reporting in 1972.

"While the number of states without a plan is decreasing yearly, it is still too large," Nasis said.

Over the years, such a plan has laid the groundwork for either consolidating computer centers or halting further proliferation of computer facilities; more important, it has provided guidelines for development of information systems needed by state executives, Nasis said.

Such a plan also provides a formal vehicle for measuring and monitoring progress; its importance cannot be overemphasized, the report said.

It is encouraging, the report noted, that written quantitative control standards were cited for "batch input" by 29 states, for "on-line input" by 23 states and for "run-to-run" by 28 states. Nasis called these standards "additional signs of maturity and professionalism in the field."

Further, the complexity and controversy associated with the lease/purchase deci-

The third level, or top management, earned \$18,000 to \$33,600.

Systems programmers earned \$10,500 to \$21,000 and applications programmers were paid \$8,400 to \$17,500, according to the Nasis survey respondents.

Computer operators earned \$7,400 to \$12,800 and data entry personnel received \$6,000 to \$10,700.

As might be expected, data entry personnel made up the largest employment category, with states reporting 41% of their employees working in that area.

Systems analysts and programmers were second, comprising 28% of the average installation's staff, the report indicated.

the potential for system transferability, the association noted.

More talking and actual transfers are being made at the systems-design level than were reported, a Nasis spokesman said, but the number of systems transferred at the software level have been disappointing.

Systems transfers could be increased by a computerized catalog of state systems — a project for which Nasis has no funds, he said.

The state of Iowa is conducting a pilot project known as the Information Systems Index. The machine-readable index includes an abstract of the significant computer applications in each of seven state governments.

It also lists hardware, software and the name of the individual to contact for additional information.

Although transferring computer applications is "fraught with difficulties," it has proven economically sound, demonstrating a cost-savings ratio of about 4:1, the report said.

One Security Project

In the area of security and privacy, the report noted the work of its Committee on Security, Privacy and Confidentiality, especially its guidelines for a state information practices act and its data security procedures checklist.

However, at present, the sole project Nasis is pursuing in this area is a cost estimate for various security measures that might be adopted, depending on the degree of privacy needed.

Sixty percent of states reported adopting a physical security plan in 1975, yet only 45% showed such plans were being enforced and less than 29% reported regular audits of the plan.

Only four states currently have general privacy legislation — Arkansas, Massachusetts, Minnesota and Utah. Thirty-three states reported Executive Orders on privacy, according to the report.

Copies of the *Nasis Annual Report* are available at \$17.50 with a 10% discount offered for orders of 20 or more from Sandy Humston at Nasis Headquarters, P.O. Box 11910, Lexington, Ky. 40511.

Tally by Hand Vindicates System Used in Texas Mayoral Election

By a CW Staff Writer

EL PASO, Texas — Computer Election Systems (CES), the Berkeley, Calif., firm that designed the election system used in the last mayoral election here, was cleared of any wrongdoing after votes from the election were recounted by hand.

Although the "CES program showed no deficiencies," however, it was dropped in favor of a less expensive system written in-house, according to Raymond Zitor, El Paso County DP manager.

A hand tally showed the original tallies were basically correct, with computer error so minor "it could hardly be counted. Errors varied by precinct," Zitor said, "but were less than one in 7,000."

CES had been charged with possible fraud by defeated candidate Woodrow W. Bean, who lost the election by an estimated 3,000 votes [CW, Aug. 6].

The charges were based on findings from tests conducted by Management Analysis, Inc., a systems house here, and subsequent information provided by computer security expert Jerry Schneider of Los Angeles, who specializes in computer fraud investigation.

"There was total vindication of the count, and Judge Sam Paxson indicated there was no basis for any judgment at all in the thing," Zitor said.

Further, "we don't know whether the vote count when they did it by hand was any more accurate than the original one done by computer," he said.

The system written in-house was tested and proved satisfactory in a local school election recently in which more than 39,000 votes were cast, Zitor said.

It was written for \$6,000, and no addi-

tional follow-on costs are expected. The cost of using the CES system ranged from \$500 to \$2,000 per election, depending on the number of candidates and precincts involved, he explained.

In addition to cost considerations, however, county officials were sensitive to local criticism of using proprietary software. "Quite a few people who were involved claimed we were bringing in a so-called 'black box' that nobody could look at to count votes."

To quash those complaints, a compiled listing of the system written by the county has been filed in the county clerk's office, where anybody can come in and see how it counts, Zitor explained.

MIT Plans Program On Technical Writing

CAMBRIDGE, Mass. — The Humanities Department of the Massachusetts Institute of Technology (MIT) will offer a special one-week program Aug. 9-13 on "Communicating Technical Information."

The seminars will consist of informal lectures on the "principles that underlie successful communications," discussion and debate and staff consultation.

Subjects covered will include "How to Organize and Teach an In-Plant Writing Course," "Solutions to Problems in Communicating Across the Atlantic" and "How to Help Writers Who Use English as a Second Language."

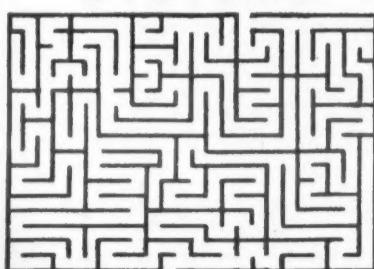
Further information is available from the Director of the Summer Session, Room E19-356, MIT, Cambridge, Mass. 02139.

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IBM Filing to Overturn Catamore Says Trial 'Suffused With Error'

By Molly Upton
Of the CW Staff

BOSTON — IBM has filed a two-volume pleading with the appeals court here detailing arguments why the verdict against the firm in the Catamore vs. IBM case should be overturned or a new trial allowed.

Catamore Enterprises, Inc., a jewelry manufacturer in Providence, R.I., was awarded \$11.4 million in damages last year in a suit charging IBM with breach of contract and warranty as well as with overselling, fraud and negligence [CW, July 9].

"This was a trial which was suffused with error and which inevitably produced an erroneous result, which only this court can now correct," the IBM filing stated.

The increasingly numerous attorneys for IBM on the case argued that the alleged oral agreements for systems engineering services (SES) and software should be superseded by the written SES agreement of December 1969.

Much of the Catamore case was based on the oral agreements.

IBM also charged Catamore's claim of fraud or misrepresentation by IBM was improperly submitted to the jury and should be dismissed.

In addition, Catamore's counterclaim of negligence should not have been allowed, IBM said.

'Incompetent Testimony'

"The damage award of \$11.4 million was the result of incompetent and improper testimony and exhibits and misleading, inadequate and incorrect instructions," the IBM brief charged.

The jury award of \$11.4 million was based on duplicative claims, IBM said, adding Catamore's projections of lost profits were improperly considered.

"It would be hard to imagine a case where to a greater extent than in this case traditional evidentiary rules were ignored

and traditional caution abandoned," the appeal said.

Catamore has withdrawn its filing for a new trial on the limited point of punitive damages [CW, Jan. 26] and is preparing a reply to the IBM filing, attorney Thomas K. Christo said.

The IBM brief outlined several reasons for many of its principal arguments.

IBM cited a deadline included in the written SES agreement of 1969, which it claimed superceded the oral one. The deadline specified one year for customers to bring any "action, regardless of form, arising out of the services under this agreement."

Concerning the claim of fraud or misrepresentation, the brief claimed that clear and convincing proof of fraud was not provided and that statements of opinion do not qualify as a basis for a fraud action.

The filing also observed Catamore did not attempt to rescind the SES agreement prior to filing of the suit and is not entitled to do so now for the purpose of attempting to avoid the agreement.

The appeal labeled as a "fundamental error" the court's decision to allow Catamore to avoid the SES agreement.

"The effect of the error was to allow Catamore to have the benefit of its contractual dealings with IBM strictly on its own terms — terms contrary to those which both parties accepted in their contractual writing and which continue to provide for the fair and proper resolution of this dispute.

"It should be kept in mind that what Catamore's amended counterclaims sought was an award of consequential damages for what under the most violent stretch of the imagination could not be deemed more than an innocent mistaken representation (and, upon analysis, at best a promise rather than a representation)," IBM said.

Red Tape Tying Up Programming Of Federal Impact Aid Funding

By Esther Surden
Of the CW Staff

WASHINGTON, D.C. — Complex federal legislation is causing problems in computerizing Impact Aid payments for this fiscal year, according to Department of Health, Education and Welfare (HEW) spokesmen.

However, the Impact Aid checks are being issued without delay, despite difficulties translating new funding provisions of the law into computer programs, according to Thomas J. Pritchard, acting chief of the Technical Assistance Section for the Office of Education.

Impact Aid is a program that allocates federal money to school districts with children whose parents live or work on federal property, HEW said.

"For about 18 months" the HEW computer center personnel had been "trying to get policy set, procedures established and methods of making payments defined," Pritchard said.

"We in the computer department do not make those policy changes; we do not change programs until the policy is known. The system hadn't even started to be changed until January of this year."

The original Impact Aid legislation was enacted in 1950, but recent amendments to the laws called for the restructuring of the allocation methods, HEW said.

"The legislation changed categories, changed provisions of how payments would be made," Pritchard continued. "What they (the programmers) are doing

is making payment formulas, and you can't make the formulas until the people decide what percentage will be paid for what reasons," he added.

Rather than continue with the old method of funding or take a chance that the new system wouldn't be up on time, HEW sent payments amounting to 50% of last year's funding to each of the schools, Pritchard said.

When the completed computer program is run on May 1, the deadline for the programming effort, "we'll just recompute" and distribute the funds owed, Pritchard said.

The Division of School Assistance in Federally Assisted Areas (SAFAA) normally makes partial payments throughout the year, so the 50% partial payment doesn't represent a hardship for the schools involved, he said.

The Impact Aid program was extended to 1978 through the Education Amendments of 1974, which also called for the restructuring of the funding provisions as of fiscal 1976, HEW said.

The Education Amendments legislation is implemented via regulations, an HEW spokeswoman said, and the regulations in question were not developed until Dec. 5, when they were published in the *Federal Register*.

The programs are being run on an IBM 370/168 and a 370/165; five people are involved in the programming, Pritchard said.

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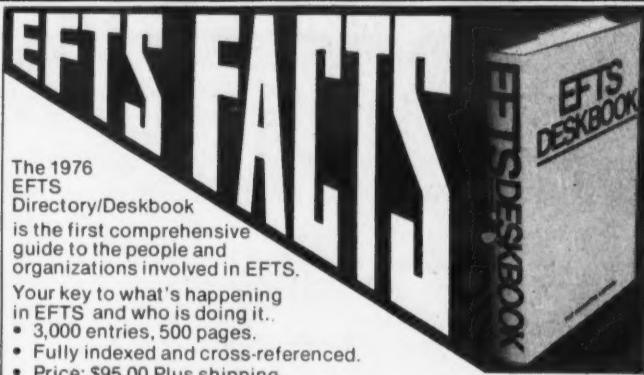
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Also Forms Policy Group

HIS User Group 'Hammering Into Shape' Position Paper on Software Licensing

By Nancy French

Of the CW Staff

DENVER — Although the dispute over Honeywell's software licensing policy was not resolved at a users' meeting here recently, the group did formulate a position paper on the subject for presentation to Honeywell Information Systems (HIS) management shortly.

In addition, the Honeywell Users' Group for Small and Medium Systems (HUG) established a policy committee to help define its positions in three other subject areas.

The wording of the position paper is being "hammered into shape" by HUG President Mac McNamar, and a summary of the communication, as well as its accompanying 25 questions, will be made available to the press after HIS receives the document, McNamar said.

John Morgridge, HIS vice-president for marketing operations, represented the vendor at the meeting and invited users to submit input on any concerns they had.

Honeywell would be glad to "respond in a way that was constructive to both sides," he added, but made no promises Honeywell would take any positive action on the software licensing policy.

At present, HIS charges users of second-hand computers purchased from sources other than HIS a license fee for use of HIS operating systems. Users who buy used equipment from Honeywell are not so assessed.

Users have complained this policy devalues their equipment and makes upgrading very costly.

Standing Policy Committee

The policy committee approved by the HUG membership will be a permanent standing committee of not more than five people. Only half of its members will change annually to assure continuity.

HUG also resolved to take a more aggressive attitude with Honeywell in pursuing resolutions of conflicts that are brought before the committee.

Among the matters to be submitted to HIS are HUG's objections to the software licensing policy.

The users also voted to institute a program to encourage greater participation in HUG by local user groups and to use its policy committee as a forum for problem solving.

This does not mean the committee intends to become an arbitrator between HIS and its customers, according to Jim Healy, permanent vice-chairman of the committee.

"It does mean that if we have information from Customer A that might help Customer B, we'll pass it along," he explained.

The committee will have no power to communicate with HIS directly; instead, it will formulate positions on issues as they come up for consideration by the HUG board of directors.

A key feature of the new organization is its proposed data bank of users' contractual agreements with Honeywell. This information will be used to help other users, McNamar explained.

International Computer Negotiations (ICN), a consulting firm that assists users with contractual aspects of computer acquisition, also was retained by the users.

Joe Auer, ICN president who attended the meeting, explained his firm was prepared to "advise" the standing committee on what is generally going on in the industry contractually as well as provide information of a general financial and legal nature.

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Attorney Predicts Positive Ruling on Software Patents

By Don Leavitt
Of the CW Staff

ATLANTA — "I have a gut feeling that when the Supreme Court finally makes a definitive decision [on the patentability of software], it will follow the Court of Custom and Patent Appeals [CCPA] and find programs are patentable," attorney Manny Pokotilow said here recently.

The high court's denial of a patent for Thomas R. Johnston [CW, April 5] didn't challenge the CCPA's ruling that software, couched in language that describes it as an apparatus, is patentable, Pokotilow noted at a meeting of the Association of Data Processing Service Organizations.

Instead, the Supreme Court threw out Johnston's application because it "just wasn't different enough to be nonobvious."

The definitive answer on patentability for software, however, won't come until a

patent infringement case based on an existing patent finally works its way through the federal circuit court system, he added.

"The CCPA route" must be handled on a case-by-case basis and won't answer the basic question, he said.

Developer's Hazard

In any case, the patent application process is expensive and it has another hazard for the developer, especially if the application is rejected, Pokotilow said. As part of the process, the source code of the program has to be published — "which means you lose any 'trade secret' protection you ever had," he noted.

Copyrighting "is a creature of statute" and doesn't protect ideas, concepts or algorithms within the program, Pokotilow said. Following the formality of registering copyrighted material requires the publication of the code "so you shouldn't

follow this route," he warned.

"Common law" copyright, however, holds some protection similar to that provided under "trade secret" legislation, he continued. To follow this approach, "mark your products with the copyright warning, but don't register the code itself," he advised the meeting's attendees.

Trade secret protection is the best: the cost is minimal and the protection is immediate, Pokotilow said. Under the law, any techniques which provide a competitive advantage over others can be considered trade secrets and there are severe penalties for stealing them.

Keeping the Secrets

The burden of maintaining secrecy can be severe. Employee agreements can help, but even accidental disclosure destroys the trade secret protection, Pokotilow said.

Independent development of the same

technique creates another trade secret and would not constitute a violation of the first secret-holder's protection, the attorney went on.

The panelists who followed Pokotilow at the meeting presented a spectrum of experience with these protection mechanisms. Bruce Coleman, president of Boole & Babbage, Inc., said he had copyrighted his company's manuals and the names of his products.

He holds a patent on the methodology behind some of the products, but "that has no real value and it's not really satisfactory," he said.

The expense of enforcement and the impact of attempted enforcement on potential buyers of his products were the two basic problems, Coleman said.

Although some users feel they need source code, Boole & Babbage usually doesn't give it out. "We feel it's better to improve the user's interface with the code we give than to disclose the source logic," Coleman explained.

Lucky in Honesty

Thomas Conway, president of Alltax Information Services, told the meeting of his basic faith in the honesty of his clients, but said he was lucky.

"Inadvertently I did the right things at the right times." He said he uses the common law copyright approach, and since he hasn't registered his source code, he still has a trade secret.

Marty Goetz, vice-president of Applied Data Research and holder of two software patents, reminded the session that most programs are not patentable, no matter what the courts may finally decide. He recognized the possibility of theft, but said that over the years he'd seen very little of it.

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Designing the Data Base	May 18-21	June 15-18	July 26-29	July 12-15
Appl. Systems Design in DB Env.	July 19-21	June 2-4	June 21-23	May 24-26
Structured Design Principles	June 14-15	—	July 12-13	Aug. 9-10
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Not Penetration by Unauthorized

Abuse by Authorized Called Privacy Law Concern

By Nancy French

Of the CW Staff

CAMBRIDGE, Mass. — The dominant technological implication of the Privacy Act of 1974 is not sophisticated encryption algorithms that thwart penetration by unauthorized people; it is data management systems that bar misuse of data by authorized people.

With this idea, Arthur A. Bushkin, manager for Systems Development Corp.'s (SDC) privacy project, began a talk here last week before an audience of computer science graduate students at Harvard University's Aiken Computation Laboratory.

Bushkin, who reviewed the

legislative history of the act as well as analyzing its provision by provision for a soon-to-be-published book, called the law a new legislative thrust — an entry by lawmakers into information management — a venture that is not likely to stop here.

There are three ways to look at the privacy act, he continued:

- A means of keeping personal information confidential.
- A kind of freedom-of-information act for data subjects.
- A legislative regulation of information-processing management.

Bushkin sees the third view as most significant of the three, he said.

A consultant to the Senate Government Operations Committee, Bushkin said there is a basic conflict between the legislator and the technologist. The former sees issues broadly; the latter expects detail, precise specifications functional objectives, he said.

No Mean Task

Ironically, in enacting the privacy law as it is written, the Congress made the technologist responsible for interpreting and complying with a very general law or risk being civilly and criminally liable, he said. This is no mean task for the technologist.

The act has many subtleties that affect system design and implementation, he continued. For instance, to meet the requirements of the present act and also comply with evolving privacy laws, systems must be highly flexible, Bushkin explained.

Second, systems must be sufficiently "fine-grained" to permit access, deletions and notations at the data item level, he said, explaining that unfortunately most systems deal with information on a far grosser file or record level.

Compliance would be vastly simplified if all automated personal information systems were third-generation data management systems, but unfortunately they are not. The average government data processing center has lots of IBM 1401s and rows and rows of tape drives, he said.

To Change Order of Activities

The act is also going to change the chronological order in which activities are conducted in government agencies.

For example, the purpose of a system must be established and reported before data can be collected about an individual, he said.

Further, an agency implementing a new system or a change in its current system must submit a new systems report 60 days before a request for proposal is issued to vendors or before the data collection forms go out, he said.

"The rule applies to new systems as well as to changes to existing systems, but the kicker is, how small a change constitutes a change that must be reported? Neither the law nor the Office of Management and Budget (OMB) guidelines are that specific," he said.

"Does a change in the logical structure of the data base constitute a new system? How about a change in sort keys?" he asked rhetorically.

The rule also requires agencies to publish rules 30 days before certain legislative exemptions from various provisions in the act may be claimed.

Bushkin refused to accuse any

agency of being "noncompliant," however, he noted that there are a number of "levels of compliance." Most agencies have sorted out what the law means and published their lists of systems in the *Federal Register*.

Agencies are doing what they can to comply manually; however, little has been done in the way of retrofitting systems, he said.

Seminar leader professor Anthony Oettinger said whenever a law is passed to protect individual rights, institutions devise ways of getting around it. As an example, Oettinger mentioned the Buckley Amendment which guaranteed student access to personal files maintained about them by educational institutions, including confidential letters of recommendation.

For a while this law created some difficulty for those asked to write recommendations; however, school administrators soon found that by adding a waiver to the recommendation forms, most students would waive their right to see such material. Now about 80% of students are signing the waiver, Oettinger said.

Jeff Meldman, a computer science professor at Massachusetts Institute of Technology (MIT) noted that at MIT 10% to 15% of students have been exercising their rights under the Buckley amendment and not signing such waivers.

North Carolina Joins NCIC/CCH System

WASHINGTON, D.C. — North Carolina is the eighth state to become a fully participating member of the Federal Bureau of Investigation's (FBI) Computerized Criminal History (CCH) system.

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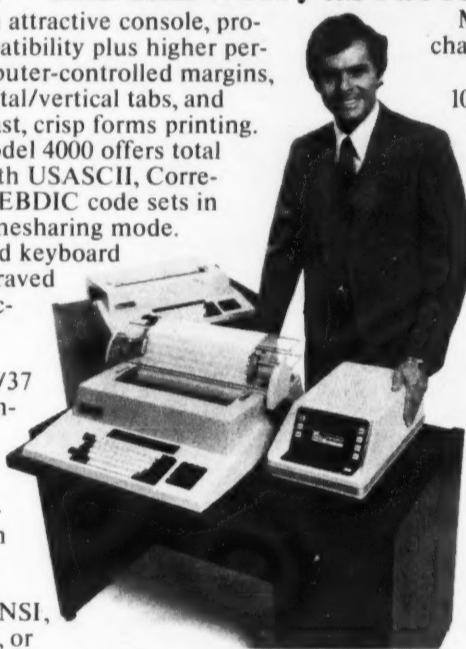
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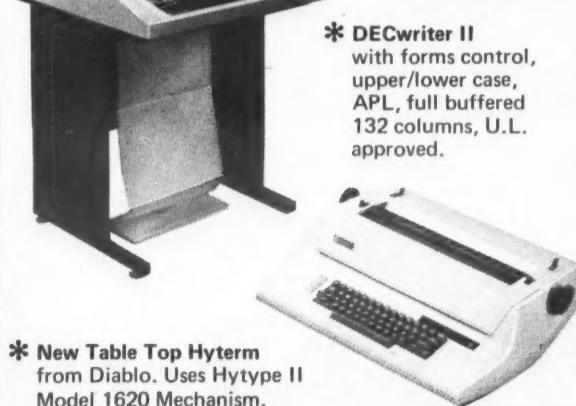
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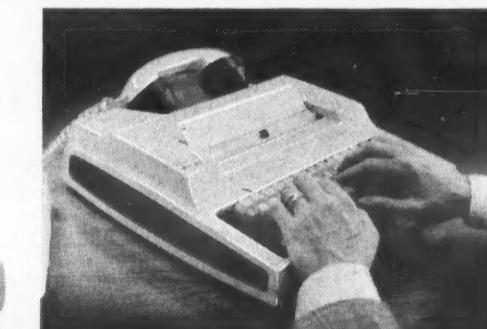
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BY Robert Brockman, President
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Editorials

A Policy Vacuum

Recent filings by the Office of Telecommunications Policy (OTP) of the White House indicated once again the desirability for a moratorium on the development of electronic funds transfer (EFT) systems.

While OTP specifically called for an end to the involvement of governmental agencies in the operation of such systems [CW, April 19], the concerns expressed by the agency could very well hold true for private efforts as well.

As OTP was criticizing the efforts of federal agencies to create a federal role in the operation of EFT systems, the National Commission on EFT that is supposed to help formulate policy in the field was finally getting around to establishing its first subcommittees to investigate the systems.

Meanwhile, private developers — often in concert with local Federal Reserve banks — are moving rapidly to begin new clearinghouses and operate EFT systems.

Clearly this development is taking place in a policy vacuum, and many systems may be a fait accompli when policy is finally made.

A moratorium on the initiation of new systems is the only way to slow the explosive growth of local experiments in EFT.

Congress should immediately enact legislation barring these experiments, at least until the commission has reported and national policy has been set.

Sweetening the Pot

There is growing evidence that IBM's Systems Network Architecture (SNA) plans are undergoing some agonizing reappraisals.

The most pronounced indications are a small but apparently steady stream of concession-type announcements, each providing capabilities that make SNA less of an upheaval to the user.

A major concession was made when IBM decided that users of the Telecommunications Access Method (Tcam) could, after all, use some SNA terminals instead of being required to switch to the costly and still-cumbersome Virtual Telecommunications Access Method (Vtam).

Next the 3600 specialized banking terminal system gained some flexibility when IBM announced the system could operate with Binary Synchronous Communications methods. This is especially significant because the 3600 system had been one of the few IBM specialized terminal systems limited to a Synchronous Data Link Control (SDLC) protocol from its introduction.

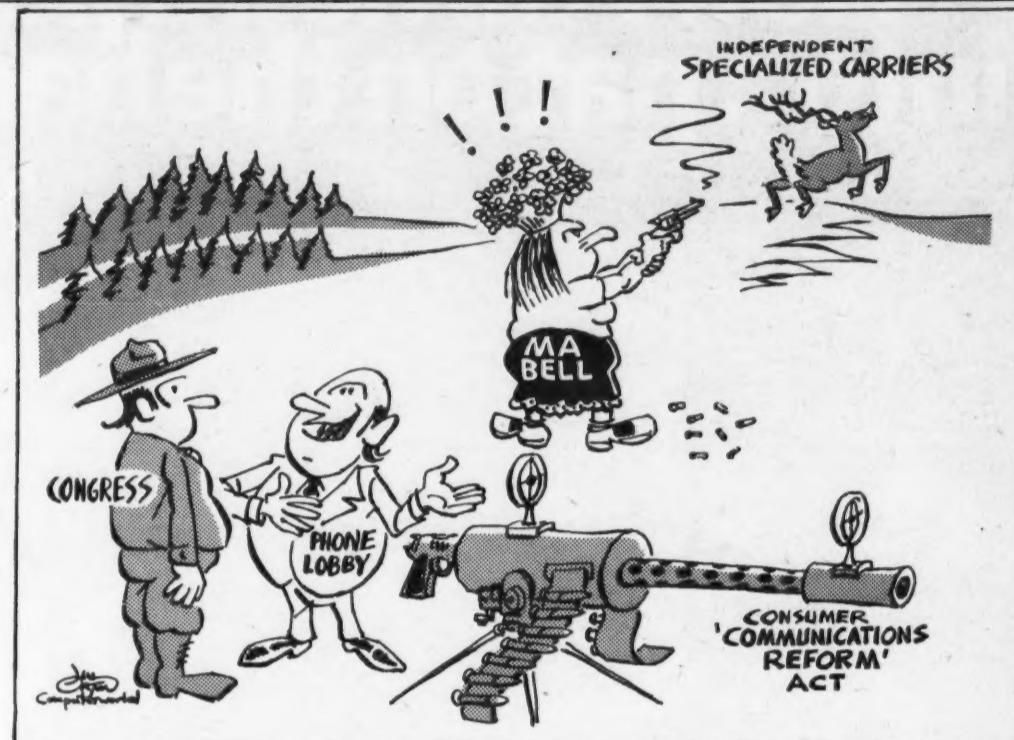
These events have occurred against a backdrop of several price rearrangements affecting terminal systems.

Other more subtle events, such as improved teleprocessing support for certain equipment, point to chinks in the originally conceived SNA armor.

What all this means inside IBM is questionable. On the outside, users have obviously expressed healthy reticence at major IBM-inspired overhauls of their teleprocessing networks. In return, IBM is trying to sweeten the pot with some additional flexibility.

There are those who predict that IBM had been unable to implement many of the SNA features that it first triumphantly announced.

Users are looking before they are leaping. Maybe the longer they wait, the better the SNA environment will become.



'Could We Use This? Her Aim's Been Off, Lately...'

Letters to the Editor

Establishing Software Standards

Could Prevent Reinventing Wheel

Much has been written in *Computerworld* on the benefits of buying software products and avoiding recreating the wheel.

With the great cost involved in developing applications we must find a method much more cost-effective than is available today.

However, one of the more serious problems in searching for software products is the lack of standards available to measure a software offering in a particular area of interest. The terminology used seems one part of the problem.

For example, the terms "payroll" or "accounts receivable" package are so vague and have such varied meanings they are not really useful without further definitions. An analogy would be to start with the term "transportation" when looking for a bicycle or a diesel locomotive.

A user/customer looking for particular software is faced with the problem of having to determine whether the software package being offered is just

a bicycle or heavy transportation.

There is no known source of consistently objective and reliable information about software products.

The leaders in the software industry surely have much to gain by getting together to establish effective product standards and to more precisely define product terminology for both application and general-purpose software.

Considerable redundancy and many poor offerings that adversely affect the software market could be eliminated with such an effort.

Robert G. Frerking

Columbia, Mo.

Marketers Must Heed Consumers

In the editorial of March 29 "Nobody Scanned the Consumer," I believe *Computerworld* overlooked a fundamental point.

One of the reasons for consumer resistance to UPC is a mass distrust of our political and economic institutions. This is partly a result of past exploitation of the consumer and partly a result of the Watergate Syndrome, but has foundations in a very real consumer concern.

Failure to recognize that there has been a fundamental change in the attitudes consumers hold about business ethics and government practice is the root cause of manufacturer and marketer disappointment.

It is unlikely that a campaign to "stress the public benefits of Universal Product Code (UPC) systems in an all-out educational effort" would have done more than raise consumers' apprehensions that they were being conned into another rip-off.

On this basis, it is predictable that there is a shock in store for credit card companies that are replacing the copies of the customer-signed charge statements with computer generated memo notices. There is no way consumers will feel they are not being abused, and the lesson of the UPC experience should be heeded before it is too late.

Either the computer memo must be expanded to provide complete information, or a return to manual methods is in order. It is arrogant for the credit card companies to arbitrarily transfer the audit burden to consumers, and it is naive to think they can get away with the current "innovations" without raising a storm of protest that will undoubtedly result in federal legislation unfavorable to the industry.

Bob Katzive

Data Past

Five Years Ago
April 28, 1971

LOS ANGELES — The local chapter of the Data Processing Management Association (DPMA) voted 60 to 7 against the four-year college degree requirement for the certificate in data processing (CDP).

MINNEAPOLIS — IBM called a series of mergers completed by Control Data Corp. an international "conspiracy" and said CDC should divest itself of Commercial Credit Corp. and "over 50 competitors, customers and suppliers" of DP equipment. The charges were made as part of a lengthy discovery portion of an antitrust suit filed by CDC against IBM in 1968.

Eight Years Ago
April 24, 1968

MINNEAPOLIS — Service bureaus went to the Federal Circuit Court of Appeals here in a continuing effort to have national banks barred from selling DP services.

NEW YORK — John Diebold, chairman of the Diebold Group, established the Diebold Institute for Public Policy Studies. The institute's object was to identify the human issues raised inadvertently by science, to produce a public awareness of these issues and to initiate action by key people and institutions on these matters.

(Other letters on Page 18.)

Computerworld welcomes comments from its readers. Letters should be addressed to: Editor, Computerworld, 797 Washington St., Newton, Mass. 02160.

Who Owns the Data?

Jim Jinkins was quite right [CW, March 29] in complaining that I gave my answer to Mr. Hardhat without really ever telling readers what his position had been. That was in my column of March 8, by the way, before I forget again and begin in the middle a *second* time!

Let me start over, apologetically. I had attended a workshop in San Francisco devoted to the interaction of computers and the auditing process, with particular attention to privacy and security. The chap who got my back up was Edward Brennan, Jr., head of TRW Information Services in Long Beach. And his general title was "Privacy Legislation."

His themes repelled me very strongly, as did his pugnacious and uncompromising — in fact, quite Groschian — delivery. They were as follows: Growth Is Great; Profits Fuel Growth; Privacy Laws Endanger Profits. His conclusion was: Privacy legislation is very bad, un-American; Get lost, Bleeding Hearts!

In the column Jinkins objected to, I said that people like Brennan "never learn," and spent my feeble energies attacking the second and third of his themes. Given more space, I would have said that profits are not sacrosanct, but simply payment for the use of capital, just as wages, or the cost of pollution control, are payments for the use of people or the natural environment respectively. I called for balancing the various charges against an enterprise, and went on. I had no room to do the "Limits of Growth" bit, nor is that argument a particularly pertinent one in our trade, where the mining of data never exhausts the ore, and we recycle our ones and zeros far better than aluminum beer cans!

Brennan had another major claim, which I did not refer to in March but which merits exposition and rebuttal. His position, and that of virtually all the data bank proprietors in commerce and government, is that an organization owns the data in its files. Regardless of source, regardless of sensitivity, regardless of defects, that information is a valuable property that can be bought and sold, that can generate profits,

that can — believe it or not — be borrowed against.

Over and over again, in the fundamental books and papers, the Ware/HEW report, the recommendations of state government commissions across the country, and of course in the Nader and ACLU polemics, data about individuals is held to be subject to the control of those individuals: passed to a Federal or state or local or commercial activity for a specified or understood purpose only. But as Senator Ervin first pointed out in the late Sixties, there is no constitutional-level law in this area. And so far, precious little case law; even in situations where damages have been sued for and won, judgment has been based on errors, accesses by intruders not supposedly authorized (data theft), and so on. There has been no in-depth consideration of the ownership problem.

The realities of our complex and greedy culture militate against bypassing the problem. Hans Peter Gassmann of the OECD says, "Pay cash!" Great idea, if you're frugal (Gassmann isn't). But what about your driver's license, your emergency hospital admission, your college entrance application? If the demanding agency does not *volunteer* to use your personal data only in specified ways, how do you force it to do so? Many data-entry forms carry the notation, "Mark only indicated boxes" or "Do not deface this form"; besides, unless you keep a Xerox of your annotation, and are prepared to sue, and can demonstrate fairly concrete damages, your scribbles can be (and always are) ignored. Nobody sees 'em but the keypunch operator! In many big systems, as we all recognize, the original document is discarded after verification anyhow.

No, fundamental legal action will be necessary. Consumer demands — and that means voter demands, to a politician — will ultimately bring it about, albeit very slowly indeed in Chicago, in Mississippi, and in the bowels of HEW. Brennan will be proved wrong. Nader right, in the final report. But what does this mean to data processing people? Well, linkages, financial gussets — of course. But most of all, a

mild internal advocacy: tell your bosses that change is coming. You don't have to jump up and down and wave Ralphie's shirt; you may even quite honestly agree with the credit bureau kind of position. But tell them upstairs that demands for privacy and security will increase, will need to be met, and will cost something now (those flag bits and those linkages) and a lot more later on.

Equate the costs of privacy with the costs of pollution control. If you want to make steel, you are going to have to keep the air and the waters clean; if you want to sell credit information, you are going to have to pay the costs of security, of logs, of annual or even quarterly cleanups, of many notifications and permission requests directed to file habitants.

For ordinary organizations, that may well add ten or twenty percent to shop costs; for a motor vehicle department or a giant credit bureau, much, much more — perhaps two or three hundred percent, in the latter case. Hardware and processing costs are dropping, and will continue to do so for many years, but systems analysis and software costs inflate more than enough to soak up the savings. No, it will cost plenty.

But in the end, data about a person will inseverably belong to that person. The bard had it: "... he that filches from me my good name/Robs me of that which not enriches him,/And makes me poor indeed." Shakespearean now, constitutional soon!



Herb Gross

Standard Would Correct Problem

Inconsistent Identification Mars Descriptive Billing

Wolfgang Hoehenwarter until recently was happy with the particular Master Charge system employed by his bank. Indeed, he thought it was outstanding. This was quite a tribute to the bank concerned — the Heritage Bank in Illinois — because Hoehenwarter is quite knowledgeable in these things, being a principal research associate in the banking industry.

His opinion now has changed — and he has doubts about the whole idea of descriptive billing as it is currently being practiced. The change came as he was preparing to pay his April bills. Hoehenwarter found a charge from Lake View Furriers, where he has had no occasion to charge anything. He knew of the place because last January another charge from Lake View had appeared on his account.

At that time he had investigated and found that the charge really related to a genuine charge at another local shop —

the Blossom Shop. Regarding it as a small random error, he was happy when the bank took corrective action promptly and courteously. But when it occurred again in April he realized that there was more to it, and his investigation of the circumstances widened.

What he found was that neither The Blossom Shop nor Lake View Furriers is a direct customer of his bank, but that the billing was forwarded to his bank electronically.

Misleading Names Sent

Further, when this happens, frequently the owner's name is substituted for the location where the transaction occurred — even when it is misleading.

In this particular case, Lake View Furriers happens to own The Blossom Shop.

Hoehenwarter found, however, that this substitution was not some local aberration, but occurs on a national level — as when a large food chain owns a chain of toy stores. Here, the messages transmitting the billings give the name of the food chain, not the toy subsidiary.

So far, the story is familiar. A belief in the system is sustained through a bad occurrence by politeness and the concept of a random accident. Then a repeat

"accident" occurs and an investigation shows there is a system flaw, leading to a loss of belief in the system and a protest. It is a rare time that my mail does not include such a story.

But the next two lines of Hoehenwarter's letter took the situation out of the normal and offered a neat standard with which to judge the whole system! And that is unusual. "The question is, how 'good' is descriptive billing if the description does not match the customer's sale slip?" Hoehenwarter asked.

And that is an excellent and penetrating question, one that I have not heard before. Moreover, it is realistic and attainable — at least in part.

Consider a sales slip. It normally has:

- Merchant identification.
- Transaction date.
- Total charge.

Then consider a credit card statement. It, too, normally has these three pieces of information. (At least, some of the better ones, such as the Heritage Bank, do. Others give just the posting date.)

Double Danger

Having discrepancies between these items as they appear on the statement and on the slip opens a customer up to being

double charged.

After all, because he is foolish enough to pay an unjustified charge to a furrier with no reason he should not be expected to pay a legitimate charge from a florist, is it? You can imagine the horse laughs such an argument would cause.

In fact, it is the merchant identification which is the key item of the three. You can pay a wrong amount, and it will still be credited; and you can pay based on a wrong date, and it too will still be credited against any legitimate debt. But paying to a wrong person certainly won't just be credited.

So the implied Hoehenwarter Standard — that the merchant identification on the sales slip and that transmitted and printed on the statement should be the same — is a good one.

Now, does anyone know why it can't be provided as standard information, even if it does mean adding such a requirement into the merchant/bank-card contract?

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The Taylor Report

By

Alan Taylor, CDP



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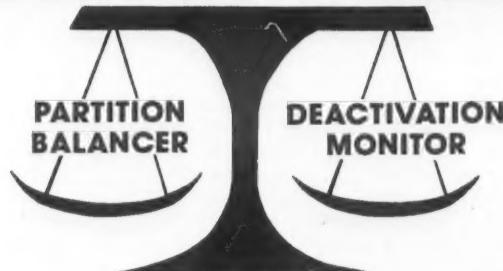
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Letters to the Editor

Off-Site Media Retention Also Solves Growth Problem

The recent article by John Price Rudy on cost-effective media [CW, March 29] omitted a fourth way of dealing with the present-day explosive growth in tape libraries. The missing method was secured and environmentally controlled off-site retention.

This is the easiest solution to the problem. It is also more flexible and provides management with a more efficient control of the remaining files.

Off-site retention is the deposit of archival and other select frequency tapes, along with disks, at locations that are accessible 24 hours a day, 365 days a year. It is cost-effective and a proven means of protecting critical and often irreplaceable files.

Rudy's article also failed to consider fully the impact his various suggestions may have on information security practices. It discussed, for example, using storage racks to pile up tapes in-house.

Increased availability of files, however, will increase the likelihood of unauthorized access to them and the possible compromise of their integrity.

Preventing this may require the creation of mediating access-control programs, as well as establishing much more selective library controls. Their cost could exceed his suggested savings.

Rudy himself noted the impact his methods could have on security practices when he wrote, "It might be wise to investigate ways of keeping the different generations of a file on separate packs."

Off-site retention seems much less complicated.

Laurence E. Tobin
New York, N.Y.

DP's Effect on Quality of Life Open to Disputation

In his open letter at the 1976 Computer Caravan, Patrick J. McGovern treaded on thin ice when he exhorted the attendees to renewed professional dedication on the basis that computers can improve "the quality of life for all of our people."

The notion that computers have had, or indeed can have, a positive effect on the overall quality of life is open to considerable disputation.

McGovern would have been more accurate, albeit perhaps less inspiring, if he had described the beneficiaries of his holy cause as those of us who get a kick out of running in the rat race, have innards like a mainframe and have a fondness for plastic.

H. Reddigh
Detroit, Mich.

Dear Computerworld:

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- DEMANDING
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SOFTWARE & SERVICES

X3J3 Chairman Explains

Draft Fortran Standard Seeks Update Without Upset

By Don Leavitt

Of the CW Staff

NEWTON, Mass. — In developing the draft proposing a revised Fortran standard [CW, April 12], "we made a number of changes but — until last year — nothing that would invalidate programs written in conformity with the 1966 standard," according to the chairman of the American National Standards Institute (Ansi) X3J3 technical committee.

The need for changes, even if they conflicted with the earlier standard, became apparent in such areas as the so-called Hollerith data type, Frank S. Engel Jr. said.

This was essentially a way of providing character manipulation facilities, but various implementors handled it in different ways," so it really wasn't standard after all," he explained in an interview here recently.

The proposal now out for public comment — "We call it Fortrev" — has replaced the Hollerith data type with a Character Data Type. To ease users into

the new environment — assuming it finally becomes the new standard — "most implementors probably will provide Hollerith support as an extension," Engel added.

Externals, Intrinsics Combined

Basic External functions have been eliminated as separate parts of the language, having been combined, instead, with the Intrinsic functions defined in 1966. The new Intrinsics will allow implementation of at least some of the capabilities in hardware if the vendors wish, Engel explained.

A PARAMETER statement has been added to set values for constants at compile time. This feature should be helpful in solving such problems as initializing arrays, he said.

The size of arrays has been expanded sharply. They may now have seven dimensions instead of the three supported by the 1966 standard, he added.

Fortrev provides for negative as well as positive subscripting, the X3J3 spokes-

man continued, noting this permits bidirectional movements through arrays and other tabular data.

Free-Format Approach

The proposal includes some changes in I/O handling as well. Support for direct access files is part of the draft, as is an ability to accept and create "format-free" files, which Engel described as a list-directed formatting similar to a facility that has been in Basic for some time.

Somewhat akin to unformatted file schemes, the format-free approach allows data to be passed to and from files just as it is generated. It is as "quick and dirty" as the unformatted approach, Engel acknowledged, but format-free files should be transportable between machines whereas unformatted files are not.

A SAVE Statement is built into Fortrev to capture intermediate computational results and the status of constants and control signals set or used in subroutines. Under the 1966 rules, these could be saved, but the process was cumbersome

"and that isn't the way it should be," Engel said.

Standard Dropped

X3J3 has effectively dropped the Basic Fortran standard (X3.10-1966) since it was not implemented by any significant number of developers "and, in any case, it really wasn't a proper subset of the full Fortran standard."

In place of X3.10, the committee has created a completely new subset which is proper, he said.

Specifications of the full Fortran and its subset are published side by side — so they can be compared — in Vol. 11 No. 3 of the *Sigplan Notices* from the Association for Computing Machinery (ACM).

Appendices to the 164-page proposal include comments and lists of the points X3J3 recognized as incompatible with the 1966 standard. The publication also includes — although Engel feels it is "angerous" — a "railroad diagram" of the language syntax.

The danger, he argued, is that if any of the arrow heads in the diagram are inadvertently reversed, the flow logic is incorrect and assumptions built on it could be disastrous.

The *Sigplan Notices* with the proposed draft is available for \$5 per copy prepaid from ACM at 1133 Ave. of the Americas, New York, N.Y. 10036.

Comments on the proposal should be sent prior to July 4th to X3 secretary Robert Brown, Computers and Business Equipment Manufacturers Association (Cbeam), 1828 L St. N.W., Washington, D.C. 20036.

Packages Keep DP Center Happy on 360

By a CW Staff Writer

PEORIA, Ill. — Many installations save money by leasing hardware from multiple vendors. Keystone Construction's wire division follows that approach with a 360/50 from Leasco Corp. and a whole range of IBM-compatible peripherals from other vendors.

But the DP operation here goes as smoothly as it does, including remote support for three other Keystone locations, partly because the division spends roughly \$1,800/mo on an array of software packages from various sources.

The mixed-vendor hardware/software environment and the staff (nearly half of them hold the Certificate in Data Processing [CDP]) make an almost unbeatable combination, according to Jack Sengalli, system planning manager.

Tied to the mainframe are 18 Memorex Corp. disk drives comparable to IBM 2314s, six tape drives from Potter and now serviced by Raytheon, a Memorex transmission control unit, a number of Sanders CRTs used in local mode and three SCS Remcom remote job entry (RJE) units. This configuration is used to support order entry, including inventory reporting and control and order status reporting, general accounting, payroll, stockholder accounting and fixed-asset management. The last three areas are covered by packages from Management Science America, Sengalli recalled.

In addition, end-user personnel here have access to the Data Analyzer from Program Products, Inc. to create their

own retrieval/report runs in batch mode.

Keystone locations in St. Louis, Mo., Crawfordsville, Ind., and Santa Clara, Calif. also utilize the Peoria center. St. Louis and Crawfordsville used to have 360/20s, but they now use the Remcom batch terminals tied to Peoria by dedicated 4,800 bit/sec lines.

The Santa Clara site is linked via a 2,400 bit/sec dial-up line. Through "two or three calls a day," the Californians enter all the data they need for payroll, order processing and inventory.

The work coming from St. Louis and Crawfordsville is much less predictable, but the operations staff completes its work in three shift/day for five day/week with no regularly scheduled weekend work, Sengalli said.

Acquired from The Computer Software Co. in late 1974, the Extended Disk Operating System (Edos) is a mainstay of the Keystone operation.

Five Partitions Used

Perhaps nowhere is the difference between Edos and DOS more evident than in the former's support of six user partitions, rather than the three allowed by IBM's control software. Keystone doesn't have memory enough for all six partitions, but Sengalli is using five.

Keystone has been a user of IBM's Power spooling system "since prerelease days," and had been using its capabilities in support of the RJE work for St. Louis, Crawfordsville and Santa Clara. But Sengalli has supported the in-house develop-

ment and recent installation of a completely new RJE monitor system.

Even though Edos announced plans for RJE support, he rejected it as "too late" to suit his needs. He also has not utilized a tape library support feature announced last spring for Edos, but that wasn't because of an in-house development.

Far from it. Keystone is in fact a

(Continued on Page 20)

IUPs Ease Trio of Coding Tasks

WHITE PLAINS, N.Y. — Programmer support is the purpose of a trio of Installed User Program (IUP) systems now available from IBM. Sequential file use is backed by one system, Cobol/CICS ties by another and Isam-to-DL/1 Cobol conversions by the third, the vendor said.

The Generalized File Maintenance System — identified by IBM as 5796-AJJ — is a series of routines designed to edit input for and update Vsam, Isam and conventional sequential files. Control cards are used to describe the files and the editing needed for each field.

5796-AJJ requires a 64K virtual partition under DOS/VS. Charge for this package is \$320/mo, which is waived after the first 12 months.

The CICS/Cobol Interface IUP (5796-AEG) eliminates the use of the CICS Preprocessor Program and makes writing and debugging ANS Cobol/CICS-based application programs "considerably

easier" than before, according to the company.

CICS/VS Cobol Call Interface IUP (5796-AHK), with 5796-AEG as a prerequisite, enables the user "to take advantage of enhancements" built into CICS/VS, the spokesman said.

5796-AHK differs from other IUPs in that IBM's support will continue "until further notice." And the monthly fee for use of the package (\$75) is not waived after the first 12 months.

The Isam-to-DL/1 Cobol Program Translator converts Cobol source programs that use Isam into "exactly equivalent Cobol programs that use DL/1" to access the same data, IBM said. It lists coding it considers unusual so the user can determine if the translation was done correctly, the spokesman added.

The translator package (5796-PFB for DOS or DOS/VS; 5796-PFC for OS, OS/VS and VM/370) is available for a one-time license fee of \$3,500.

Comput-A-Charge Features

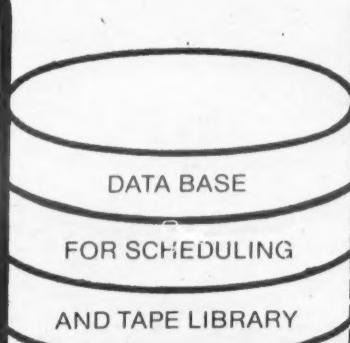
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'Spooler' Supports DOS Operations

HARRISONBURG, Va. — The Spooler from Datacorp. of Virginia, Inc. is said to combine spooling with facilities to provide "significant" improvements in throughput while reducing operator and system overhead for IBM DOS and DOS/VS sites.

Spooling moves output in high-speed mode to intermediate storage on disk before transferring it asynchronously to the low-speed peripheral — normally a

printer or a punch — that was its original target. With this approach, the user's program executes faster than if it had to wait for the low-speed equipment.

But Datacorp's package also includes spooling of CPU console output, priority balancing, scheduling and "complete procedure library with edit" facilities, the vendor said.

The procedure library support extends to conditional use of user-designated JCL

statements, a spokesman added.

The Spooler also supports nesting early-start printing and punching, the use of both on-line and off-line computer output microfilm (COM) equipment and control of user jobs in case of abnormal termination. Collection of job-accounting statistics is another feature, the vendor said.

With this repertoire of facilities, the package allows users to obtain status reports of the operating environment to monitor paging of individual programs and the overall system under DOS/VS, to queue jobs from the console and to start, restart or cancel partitions.

This should mean the reduction or elimination of deactivation and a cutback in paging rates, the spokesman said.

Requiring no changes in the IBM-provided supervisor, Spooler is available for \$400/mo under a rental plan or \$375/mo on a two-year lease.

A two-year license is also available for a one-time charge of \$8,400. Datacorp noted from the RNB Center, Harrisonburg, Va. 22801.

PL/I Optimizing Compiler Code Analyzed by 'Strobe' Upgrade

CAMBRIDGE, Mass. — Identifying CPU usage by source program symbolic names and by logical loop boundaries, an enhanced version of the Strobe monitoring package from Programart Corp., simplifies the tuning of PL/I programs, a spokesman said.

The update also extends the monitoring capabilities of the package to programs that have gone through IBM's PL/I Opti-

mizing Compiler. Even before the updated version, Strobe could handle F level PL/I compiler output, the vendor noted.

In addition to CPU usage by source reference, the monitor identifies I/O resources used by each file and emphasizes the overlap of CPU and I/O demands, according to Programart.

The nine reports produced by Strobe list the most intensively executed procedures, the most extensively inactive memory areas, time distribution of activity level and direct access cylinder utilization.

Knowing these parameters of a program's execution, the application programmer can often achieve "significant" performance improvement with minor changes to the source program, the vendor added.

Strobe operates under OS and OS/VS environments on IBM 360/370 equipment. Developed by Computer System Architects, Inc., it is available for \$9,400 from Programart at 133 Mt. Auburn St., Cambridge, Mass. 02138.

'Hard' Facts From UCS

KANSAS CITY, Mo. — A pair of comprehensive programs for the design of concrete slabs, girders, beams, joists, waffle slabs, flat slabs and flat plates — with or without column capitals — are available on the United Computing Systems, Inc. network, a spokesman said.

Identical in operation, one program is for prestressed, posttensioned concrete; the other for reinforced concrete, he added from United's headquarters at 2525 Washington, Kansas City, Mo. 64108.

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S2000 for IBM Users ...

AUSTIN, Texas — IBM-oriented Version 2.70 of System 2000 (S2000), the generalized data base management system from MRI Systems Corp., has improved throughput in both batch and on-line environments by factors of 2:1 to 4:1 compared with earlier versions, the vendor claimed.

Features of Version 2.70 include compatibility with IBM's Multiple Virtual Storage (MVS) releases of OS/VS2, a rewritten buffer manager and support for an extended "where-clause" for immediate access, report writer and extended PL/I precompilers, MRI said.

In addition, there are enhancements to self-contained language processing in multithread and teleprocessing environments and additional, but unspecified, statistical aids for the data base administrator function, according to the company.

Precompilers in Version 2.70 are said to contain a fuller range of syntax and user options, Fortran equivalences, Cobol qualification support, automatic error code processing and a LINK capability.

Cost of a representative System 2000 reload/reorganize job run on Cybernet has been reduced from approximately \$10.40 under the old price schedule to about \$2.60, the company said.

Packages Keep 360 User Running

(Continued from Page 19)
staunch supporter of the Epat tape library control package from Software Design, Inc. Epat monitors both tapes being provided as input to runs scheduled for processing and tapes made available as output media.

"I don't see how any shop could function safely without it," Sengalli commented.

Again, however, Keystone didn't leave Epat alone. The installation added an on-line display of the tapes assigned to each job, by generation which is normally prepared in batch mode. The display version includes those files created since the most recent printed report and can prevent inadvertent use, for example, of the wrong tapes in test runs.

'Docs' Praised

Another package that received high praise from Sengalli and others at Keystone was the Display Operator Console Support (Docs) from CFS, Inc. Described as essentially a console substitute, this utility puts all control messages on a CRT screen and activates a default response for all but those that truly need the operator's attention.

Although more messages may be added at the bottom of the screen, key messages are shown in high-intensity characters and are not scrolled from the screen until answered. Operators therefore can pay

attention to just those items that require their attention.

Docs offers still another advantage to a shop like Keystone that is trying to optimize its operations. Messages flashed on a CRT are available for response far sooner than they would be on the IBM 1052 console typewriter.

The 1052 can, in fact, be bypassed completely since the messages are posted to a print file as well as to the CRT. The print file can be output to a line printer, for example, for record purposes, Sengalli added.

In other respects, Keystone attempts to monitor its activities, but with mixed results. Statistics collected by Power and by the job accounting routines within Edos were in conflict, for example, and ultimately Sengalli eliminated all job accounting.

He already knew "pretty well" how the system was doing. The user departments weren't really concerned about their "funny money" accounts. And the accounting data collection added overhead which he didn't want on his system.

The installation will be moving to a 370/145 late this year, but that's to gain access to faster, bigger disks. Generally speaking, the software that has served well on the 360/50 will be moved to the bigger machine along with all of Keystone's application workload, Sengalli concluded.

Calldata Growing

WOODBURY, N.Y. — Having recently expanded its communication network to provide service throughout the U.S., Calldata Systems, Inc. has also added to its libraries of publicly accessible programs.

A Language to Aid Financial Fact Finders (Lafff), on the DTSS Honeywell 635-based time-sharing portion of Calldata's service, allows the financial analyst to retrieve and analyze financial facts and relationships "for all the years and all the companies in his Lafff data files," a network spokesman said.

The availability of both comparative and statistical analysis facilities under Lafff makes it particularly useful, he added.

Meanwhile, Perpk/EEO — to help users track compliance with Equal Employment Opportunity Requirements — is on Calldata's Computility service based on Digital Equipment Corp. Decsystem-10s in Boston.

Calldata Systems, Inc. is at 20 Crossways Park N., Woodbury, N.Y. 11797.

...and for Cybernet

MINNEAPOLIS — Enhancements and price reductions for a data management system on the Cybernet network have been announced by Control Data Corp., the vendor.

The changes affect users of System 2000, developed by MRI Systems Corp.

A reload/reorganize module to ease data base reconstruction, an audit module to show when reconstruction is needed and an integrated report writer have all been added to the system, CDC said. So has "binary file software."

Cost of a representative System 2000 reload/reorganize job run on Cybernet has been reduced from approximately \$10.40 under the old price schedule to about \$2.60, the company said.

At a time like this a slip-up can cost you plenty.

The same thing is true in high-density recording.

A lot of companies have found out the hard way that trying to use bargain-priced, uncertified computer tapes on today's high-density drives is no bargain after all. Sooner or later, the masking done with the GCR format will catch up with you. Ask your Graham product technology man to explain.

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are controlled by a uniform, multifunction operating system called PRIMOS. This means you can start with the smallest configuration to handle today's work load, and grow in modular steps to the highest level of performance, without reprogramming. It also means that you can plan on the availability of the power and capacity of Prime's new top-end processor, the model 400. Here are the important specifications:

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Government Ties Mixed Blessing for Swedish Center

By Julia Van Duyn

Special to Computerworld

STOCKHOLM, Sweden — To an American, the whole concept of Dafa — one of the largest computer centers in Sweden — and its operations are interesting if somewhat contradictory.

To begin with, Dafa (the Swedish acronym for National Center for Administrative Data Processing) is a "government agency," but with no official authority. It competes with private consulting firms and service bureaus for both government and commercial contracts and is financed by the proceeds of its contractual services.

Dafa has been operating as a private service bureau since July 1970. That was when it broke away from the Swedish Central Bureau of Statistics and became an independent organization, though still "government-owned."

Dafa's management is quick to point out the advantages and disadvantages of its position. "We can base our prices on cost-price principle. This gives us an edge over our private competitors," one of the managers noted.

But a "government-owned" service bureau has certain drawbacks. For example, if a Swedish citizen feels Dafa is managed inefficiently, or contrary to "public interest," he can go to the Parliamentary Ombudsman and make a formal complaint.

The ombudsman (a concept that originated here in Sweden's Justice Department)

investigates whether the complaint is valid or not. The consequent decision, if in favor of the private citizen, could bring a drastic reorganization in Dafa's structure and operations.

Measurement of Success

Dafa's success can be measured by the fact that its staff of about 340 moved into a large, new building early in 1975 and is operating round-the-clock with an extensive array of hardware and software.

The hardware configuration consists of a 1.5M-byte IBM 370/158 and a 1M-byte 370/145, both operating under OS/VS2, plus a 1401.

These mainframes are supported by 16 3420 tape units, four 3330 disk drives, four 3803 tape control units, three 3211 high-speed printers, two 3280 teleproc-

essing printers, card readers, key punches and 100 Swedish-built Stansaab CRT display terminals.

The facility also has computer output microfilm and optical character recognition equipment. Teleprocessing is handled by a 3705 telecommunication control unit with four telephone lines and two Danish-made RC3600 minicomputers, one with 64 telephone lines the other with 16.

Data Base Software

Dafa uses IMS and the Swedish GIS as its data base software. The facility processes applications via remote job entry, on-line, real-time and batch-processing. Production jobs run during the second and third shift, while testing is done during the day.

The diversity and number of systems Dafa has designed and maintains range from an on-line administrative system for Sweden's National Correctional Administration to a number of sub-systems for the National Labor Market Board. A real-time statistical system for the Swedish National Lottery and many batch-processing account receivable/payable applications for small commercial companies have also been developed by Dafa.

In addition, Dafa has a branch in Gävle, South Sweden, where a 768K IBM 370/155 using OS/VS2 runs the data bank applications system for a major Dafa client: the Central Board for Real Estate Data. The Gävle facility also offers DP services and computer time to businesses in that community. Dafa's management sees the Gävle operation as the first of many branches throughout Sweden.

Privacy Problems

But just as any other DP center in Sweden, Dafa has to adhere to both the Publicity Principle and the Data Act. These two laws, however, are contradictory.

The first allows free access to official documents. This law, which dates back to 1766, is regarded as fundamental by the Swedes.

The second law, only three years old, is unique in its "highly detailed regulation of the use of computer techniques both in the public and in the private sector."

In short, while any individual may go to a government agency and get permission to access all of the data about himself at any data center in Sweden, no personal file of an individual may be set up at any DP center unless it receives the permission of the Data Inspection Board, which enforces the Data Act.

A "personal file" includes real estate property, motor vehicles and anything else that contains information about the owner.

'U-Edit' Uses Control Cards

ANAHEIM, Calif. — The Universal Edit (U-Edit) package from Holiday Software Co. utilizes control cards to manage validation editing, batch balancing and subtotaling of input data for IBM 360/370-based installations.

At execution time, the U-Edit definition file, generated from the control cards, is accessed by the edit and balance routines which extract the required file definitions and compare the incoming records with those definitions.

Errors in the input are listed, as are batch balances and subtotals if requested. The user may also print out the editing definitions at any time for review, the vendor said.

Running on a 65K 360/30 or larger CPU under DOS or OS, U-Edit costs \$4,500 on a perpetual lease, Holiday said from 612 S. Harbor Blvd., Anaheim, Calif. 92805.

'Pads' Checks CICS Runs

HACKENSACK, N.J. — The Performance Analysis Display System (Pads) from On-line Software International (OSI) intercepts and builds a data base of information pertinent to the performance of IBM's Customer Information Control System (CICS) and later provides a choice of reports keyed to an analyst's specific interests, OSI said.

Although other programs have provided collection and reporting of CICS performance data, they have generally produced

"volumes of output" with "the hope that some trend would become obvious," the vendor said.

The Pads reports focus on particular performance areas as selected interactively by the user, OSI said.

System summary graphs, each illustrating an aspect of performance, "dynamically customize themselves to each environment and changing conditions," the company added.

Rather than using arbitrary standards of CPU and main memory usage and other variables to construct ranges, Pads calculates means and standard deviations for the target installation, a spokesman said.

The Composite of Activity report — another Pads output — provides the detail necessary to support the data presented in the system summary graphs. The activity on each terminal in the system is summarized; the report format thus "provides detail without bulk," OSI added.

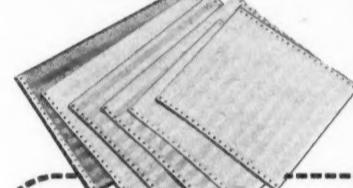
The transaction flow analysis provides a view of transaction simultaneity as well as processing peaks and valleys. System resources can be adjusted to account for processing requirements, the spokesman noted.

In somewhat the same vein, Pads' line utilization analysis may highlight system bottlenecks brought on by differences in transmission rates of data traveling over telephone lines and channel transfer rates. This report can be used to determine the need to add or redistribute lines or to determine proper line speeds, OSI suggested.

Pads requires approximately 2,500 bytes of main storage and can be used with all versions of CICS except, apparently, DOS/Entry. The programs are written in Cobol and Assembler and distributed in source code on a magnetic tape.

A complete Pads package including 10 system summary graphs and four reports is available for \$6,000, OSI noted from Continental Plaza at 411 Hackensack Ave., Hackensack, N.J. 07601.

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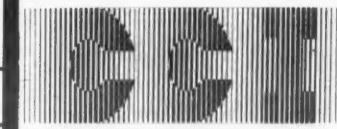
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Source-Level Equivalent Needed

Dump Debugging Needed Till Better Tools Available

By B.H. Boar

Special to Computerworld

Computerworld readers have expressed widely differing opinions on the value and necessity of debugging Abend dumps at the core level.

As one who often finds it necessary to interpret Abend dumps, I would like to add my own perspective to the discussion.

The application programmer has the same relationship to the operating system as the line user has to the application system. The user in the payroll, accounting, or other department performs the job functions based on the set of reports provided by the application system. If a report is inadequate or unintelligible, the system must be modified to correct the problem. Until the fix is made, the user must make do.

If a new report is added to the system, the user must be properly trained in its application.

Programmers are in a similar situation. They submit programs, JCL and utilities to the system and in return receive standard reports (compiler maps, JCL listings, etc.).

One of these reports is an Abend dump. The Abend dump is the standard and customary error report provided to the programmer for interpreting the cause of the Abend.

Confrontation

The programmer confronted with an Abend dump has the same choices as the line user:

- Learn to use it.
- Find alternate means (reports) with which to solve the problem.
- Request a revised report which is more readily usable.

The first alternative is to use the raw dump as presented. This requires a reasonable working knowledge of system control blocks, compiler maps, link-edit maps and their interrelationships in the dump.

Once systematic approaches are developed for the common Abends, the dump provides an almost unlimited reservoir of raw data from which to deduce the cause of the error.

The drawback with this approach is that most application programmers are not given sufficient education or encouragement to master the prerequisite skills. High-level programmers are supposed to relate to the system at the "source level."

Unfortunately, the standard error report provided when a mistake is made is provided at the other extreme as raw hexadecimal core images.

Second Alternative

The programmer's second alternative is to develop other sources from which to analyze the error in expectation of keeping the debugging at the source level. The established techniques include the following:

- Insertion of source language debugging verbs in the program (EXHIBIT, DEBUG).
 - Interactive debuggers such as TEST-COB or SYMBUG which in a time-sharing environment provide dynamic source level interaction with the program.
 - Vendor Abend monitors which "trap" the Abend. They often print a selective minidump (some in hexadecimal, some in source level) and optionally continue the program's execution.
 - Symbolic dump debuggers which will print a source level dump if an Abend occurs (IBM Version 4 Ansi compiler: SYMDMP option).
- Each of these tools attempts to provide

a more readable report, but each has certain limitations. The insertion of source language debugging verbs is done after the fact (an Abend has already occurred).

Run Required

An additional debug run is required to insert the verbs and force the Abend. Prior to the rerun, at least a superficial analysis of the Abend must be made to determine in which programs and where in each the verbs are to be inserted.

The interactive debuggers provide an excellent source level capability, but are confined to a time-sharing environment. When the system is transferred to a batch production mode, the interactive debuggers are inoperative.

The vendor software monitors generally

provide a simpler, partially analyzed dump, but as with the Abend dump they predominantly present core in raw hexadecimal. In addition, special JCL and/or program modifications are required to initiate this capability.

Source-level symbolic debuggers provide a source-level readable dump of the program. Again, to use it requires special compile options and JCL. Due to performance bloat and space restrictions, production modules are seldom run using this facility.

Revised Report Alternative

The final alternative, a revised standard report, has not occurred. Essentially the dump presented by a 370/168 MVS system today is equivalent to the dump provided by a 360/OS MFT system in

1970. Whether by vendor neglect or lack of user pressure, the standard error report has not evolved into a more usable format.

Programmers who must debug Abends reach some working compromise with the available tools. Eventually, however, the analyst who is to effectively support the application system will have no choice but to develop detailed working skills in interpreting the core dump.

Assuming the best of all possible worlds (all the alternate debugging tools available during the development phase), when the system is cut over to a production mode, these shields will no longer be readily available. When the system Abends unexpectedly, the programmer with no experience with core level debug-

(Continued on Page 26)

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GOTO 'Hopscotch' Not Structured

By Anthony van Wolferen

Special to Computerworld

In "Structured Code Can Be Built – Even With Cobol" [CW, March 22], Edward G. Nilges gave an example of a group of statements he considered "naturally and efficiently coded" using a combination of paragraph names and GOTO instructions.

His implication that redundant tests would result from GOTO-less coding is, however, not true. More than that, his style of programming – creating a hopscotch environment in which paragraph names serve as landing points for GOTOS – is exactly what "structured" programming is trying to eliminate.

In the interest of good "structured" coding, I would suggest the following solution (using pseudocode) to Nilges' sample problem:

```

000010 IF condition1
000020* IF condition2 yes condition1
000030 IF condition3 yes condition2
000040* IF condition4 yes condition3
000050 IF condition5 yes condition4
000060* ELSE not condition3
000070 action1
000080 action2
000090 action3
000100* ELSE not condition4
000110 action4
000120 ELSE not condition5
000130 action5
000140* ELSE not condition1
000150 action6
000160 ELSE not condition2
000170 action7
000180 Actions

```

As shown, comments (indicated by asterisks) can be inserted in Cobol.

I am curious to know how Nilges determined the "most natural" (using his words) way to code a given program piece, since his problem solution seemed quite "unnatural" to me in terms of structured programming.

van Wolferen is a programmer in Oakland, Calif.

Top-Down Approach Necessary For Structured Program Clarity

By K.D. Jones

Special to Computerworld

My firm has been using a version of structured programming for 18 months and we read with interest the reader articles on techniques.

Edward G. Nilges stated "The only reason for using structured programming is clarity and maintainability" [CW, March 22]. I completely agree, but submit that "top down" is more important for clarity and maintainability.

Most of the examples to date have contained a high degree of nested IFs. Nesting can be partly avoided by some GOTOS such as loop control, as illustrated by Nilges: IF NOT FINISHED-LOOP GOTO LOOP or IF FINISHED-LOOP GOTO LOOP-EXIT.

We preceded all paragraph names with

one digit (or two) and a letter, i.e., 3C-EDIT. The digit represents the level of the paragraph within the top-down structure. The letters are used simply to keep the paragraphs in sequence overall, and they can be reused; i.e., 5E-EXIT is acceptable in addition to 5E-ERROR-ROUTINE.

Performed Lower

A performed paragraph must be at a lower level within the structure than the paragraph initiating the perform. For example, within 3C-EDIT the programmer may perform 5E-ERROR-ROUTINE. Thus, any paragraph being performed must be further down the source listing and should be coded later.

With our approach, the same function as Nilges' example can be accomplished with no more IFs (3), no more ELSEs or GOTOS (3) and no nested IFs within a paragraph:

```

3A-EXAMPLE.
IF condition-1 PERFORM 4C-ONE.
TRUE
ELSE
action 5.

•
4C-ONE-TRUE.
IF condition-2 PERFORM 5F-TWO.
TRUE
ELSE
action 4.

•
5F-TWO-TRUE.
IF condition-3
action 1
ELSE
action 2.
action 3.

```

Note in this example that action 5 is coded close to first and action 2 is coded close to last; the reverse is true in Nilges' example.

We do not use a virtual memory computer. Nilges may disagree with our version of his example if a virtual memory computer is used.

Jones is supervisor of computer systems and programming at Pacific Petroleum Ltd. in Calgary, Alberta, Canada.

Debugging of Dumps Remains Vital Skill

(Continued from Page 25)

ing will have a rude awakening.

The only aid available will be the Abend dump. The time factor involved with most production systems makes rerunning with debugging aids impractical if not impossible. Until such time as the Abend dump is replaced by a standard source level equivalent, core dump debugging will remain a necessary skill which is most needed at critical times.

Critics of dump debugging who berate programmers as scavengers have recognized a problem (dump debugging can be quite difficult and complex), but are addressing it at the wrong end.

Application users expect their reports to be in English, not hexadecimal or binary. Imagine a tax clerk accepting the weekly tax report with the year-to-date cumulations printed in binary.

Similarly, programmers as users should expect that the Abend report resemble in content the source language. The problem lies not with the programmer who attempts to use the available tools, but the questionable utility of the tools themselves.

Until such time as the format, content and selection of the Abend resemble the source language, the programmer will have no alternative but to debug at the dump level.

Boar is a staff member of the information systems organization, Western Electric Co., New York, N.Y., and author of Abend Debugging for Cobol Programming, published by John Wiley & Sons.

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COMMUNICATIONS

3705 Software Problems 'Can Be Incredible'

By Ronald A. Frank
Of the CW Staff

CHICAGO — The IBM 3705 front end is cost-competitive with other equipment on a hardware basis, but the software problems "can be incredible," according to Patrick Ryan, vice-president of the Midwest Stock Exchange.

Speaking at a recent Computer Caravan session here on front ends, Ryan related some of the problems his installation has experienced in implementing a teleprocessing system using the 3705 with the Network Control Program (NCP) in a multidrop configuration using IBM 3771 terminals.

The 3705 is not really a front end since it does not have the storage required for a true front-end operation, Ryan said. Because of this, he added, it is not possible to incorporate a message-switching function into the unit.

One of the 3705's most serious limitations is that it lacks provision for input pacing from the network with standard IBM teleprocessing software. The net effect of this pacing limitation is that the network is capable of overdriving the CPU, Ryan said.

This becomes even more serious with a full-duplex protocol; the Midwest Stock Exchange will not go to IBM's Synchronous Data Link Control (SDLC) until

this problem is resolved by IBM, he said.

The exchange currently utilizes NCP in emulation mode connected to a 370/145 operating under DOS/VS. Because of problems associated with using the Virtual Telecommunications Access Method (Vtam), IBM recommended the system use EXTM, a Vtam subset. This is now running with the Customer Information Control System (CICS), but the software overhead is "incredible," Ryan told the attendees.

Using the present configuration, it takes 4,600 separate instructions to perform a read or a write command, he said. One of the reasons for selecting EXTM over Vtam is that the full access method required 100K of real storage.

But EXTM is limited to handling only one partition, so all the applications software now runs in "one big partition," Ryan said.

Initially the network included only two 3771s and one 3776. When the 3771 terminals began operating, it became apparent they could only be loaded serially into the CPU using one complete pass, Ryan recalled.

It was not possible to have part of a deck loaded from terminal A and then part of a card deck from terminal B. IBM said this could be added with an inquiry mode RPQ for \$20/mo, Ryan said.

Another problem was that terminal A could not

communicate with terminal B, but this situation is now close to being resolved by IBM, he added.

One of the reasons for selecting the 3705 was to off-load some of the control operations from the Model 145. But in the case of control over terminal polling, there were no benefits, he said.

The CICS software in the CPU controls terminal polling operations. The total off-loading benefits of installing the 3705 probably amounted to "less than 5%," Ryan estimated.

The Midwest Stock Exchange decided last September to install the 3705 with NCP. Looking back on the experience, Ryan said it would have been better if another installation had been the pioneer.

Many of the concepts had not been implemented before, and in many cases the in-house teleprocessing staff understood more about what was going on than the IBM experts that were brought in to help, he said.

One of the most serious problems is that IBM does not know how much throughput the Model 145 will be able to handle when the system reaches its planned 60 3771 terminals. Ryan worked with IBM experts in Palo Alto, Calif., on this problem, but the effort amounted to simply counting instructions, he said.

At present, the 3705 implementation is about four months behind schedule, he said.

Doll Sees ITT Looming as Major Specialized Carrier

By a CW Staff Writer

CHICAGO — Users should not underestimate ITT's efforts to get into the specialized carrier field — it will begin operating its network in the southeastern U.S. later this year and is probably one of the best funded of the specialized common carriers, according to Dr. Dixon Doll.

Speaking at a recent Computer Caravan session here on transmission options, Doll said ITT would be in a good position to acquire another specialized carrier if one should be forced to drop out because of financing problems.

Until now, the specialized carriers such as MCI and Southern Pacific have innovated mostly with pricing options. But there is a real possibility that innovative services will be offered soon, he said.

The Data Transmission Co. (Datran) has offered new services to users with its latest "postalized" tariff on the distance-insensitive Datadial service. This is presently the only switched digital service available, Doll said.

In addition, because Datadial is a full four-wire facility, it offers users a good opportunity to operate with a full-duplex protocol such as IBM's Synchronous Data Link Control (SDLC), he said.

Tariff Turbulence

Because of the "tariff turbulence" now in progress, users should develop backup network strategies to implement in the event of sudden rate hikes, Doll advised. In addition to this type of short-range planning, users should also develop a strategy for using the digital services such as

AT&T's Dataphone Digital Service (DDS), he said.

It is important that users attain self-sufficiency in the use of network design tools instead of being dependent on carriers and vendors to define the various options available, he added.

Satellite services are already available in limited geographic areas, but they pose some operating problems for users, Doll said. The often-feared propagation delay has not proved to be an insurmountable problem, although it may require some changes in protocol block lengths, he said.

One user transmitting via satellite from

Uses 3270 Line Discipline

Varian 'Pronto' Supports V70 Communications

CHICAGO — Varian Data Machines introduced a data communications control program for its V70 processors at the Computer Caravan here recently. The program provides users with support for IBM 3270 or equivalent terminals, Varian said.

Called the Programmable Network Telecommunications Operating (Pronto) system, the software supports both stand-alone and distributed processing in host/satellite, multiple-host or mixed environments using the IBM 3270 binary synchronous line discipline.

Pronto interfaces with the Varian Vortex Telecommunications Access Method and provides queueing, buffering, screen

Dallas to the East Coast took this approach with satisfactory results, he noted. More serious is the local loop reliability

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question. In many cases, satellite earth stations are located significant distances away from metropolitan areas; this means the user must put up with the reliability offered by existing carrier landlines.

management and control for buffered asynchronous and 3270-type terminals. The software has been interfaced with Hewlett-Packard 2640, Beehive Super Bee and Hazeltine 2000 CRTs as well as the IBM display terminals, Varian said.

Logically, the Pronto software requires about 10K of storage within the V70 and resides between the terminal and the application software, a spokesman said.

Existing V70 users can install the Pronto software as an upgrade to add terminal support capabilities to other applications supported by the mini. User transaction (inquiry/response) programs operating with Pronto can be written in Fortran IV, DASMR (Assembler) and V70 Cobol.

The satellite carriers will have to offer "at least a 25% to 30% reduction over other services in cost" before users should consider them seriously, he said. Improved local distribution such as the satellite rooftop antennas proposed by Satellite Business Systems will not come into widespread use until about 1980, he predicted.

In evaluating the emerging protocols, it is safe to assume SDLC will not be in widespread use for at least three to five years, Doll said. Part of the problem is that SDLC is not yet fully understood by experts both inside and outside of IBM, he added.

File access security is assured by Pronto's ability to control the programs and terminals which can be initiated, he added. Pronto employs a user-specified, five-level security scheme in which terminal, user, task and file identification plus a password are necessary to access the system.

The software is priced at \$14,000 with Isam and Qsam or \$22,000 with Cincom Systems' Total and Qsam. The Pronto system by itself costs \$12,500 for users who want to add it to installed systems.

First shipments of Pronto are expected in the third quarter. Varian Data Machines is at 2722 Michelson Drive, Irvine, Calif. 92664.

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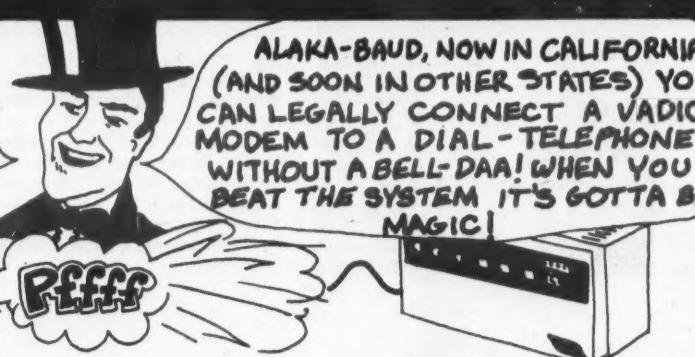
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Harris Adds Key Entry, Cobol Capabilities to 1600s

DALLAS — Harris Corp.'s Data Communications Division has introduced a series of software, hardware and systems enhancements for its 1600 remote communications processor family.

The enhancements add key entry and Cobol capabilities to the processor for local key entry operations at remote sites.

A disk-based system designated the Extended Communications Operating System (Ecos) allows a user to operate in a multijob, multitask environment performing functions such as data entry,

remote batch, file manipulation, media conversion and local batch processing concurrently on the 1610 and 1620 systems, Harris said.

Also introduced was the Local Batch Processing System, a business-oriented software system featuring an Ansi Cobol compiler, sort/merge and supporting subroutines.

Executing as a job under Ecos, Local Batch permits users to perform batch processing functions at a remote 1600 site with programs written in Cobol, a

spokesman said.

The Key Entry Processing (KEP) software system enables users to perform both local and remote data entry, file update and file manipulation operations on the 1600.

KEP applications use the Model 1675 CRT workstation, which includes 960 and 1,920 character screens, addressable cursor, four keyboard options, editing features and a lower case alpha display feature.

The 1675 can be operated locally (up to 1,000 feet) or com-

munications-coupled to the 1600. A user can preprocess and edit data at the 1600, reducing the load on the host processor and saving communications line costs, the firm said.

Supporting KEP is the Remote Generalized Application Language (Regal), described as a high-level language which enables the 1600 system to solve a variety of business-oriented data manipulation programs.

A typical system including a 65K 1620 communications processor, 300 line/min printer, 300

card/min reader, 3M bytes of disk storage, six Model 1675 CRT workstations and two software emulators on a five-year lease costs \$2,194/mo or \$92,000. The KEP and Regal software are provided free.

First customer shipments for Ecos with Local Batch Processing are slated for the second quarter. Deliveries for the KEP enhancements will commence in the third quarter, Harris said from 11262 Indian Trail, Box 44076, Dallas, Texas 75235.

System Allows Modem Backup On Data Nets

MINNEAPOLIS — ADC Telecommunications has designed a Modem Patch/Access System (MP/AS) specifically for data networks.

Located at the junction of modem and telephone lines, the MP/AS will reportedly allow pinpointing of problems by patching to a backup phone line or to a spare modem.

The same MP/AS may be used for four-wire or two-wire circuits or a combination of four-wire and two-wire circuits.

The system, priced at \$580, includes jackfield, two 25-ft connectorized modem cables, two 50-ft connectorized phone line cables, two modem terminations and two phone line terminations, the company said.

There is a \$10 charge, plus 35 cent/ft, for non-standard cable lengths, ADC said from 4900 W. 78th St., Minneapolis, Minn. 55435.

Bell-Type Modem Added to Video 100

MAHWAH, N.J. — A Bell 202-type modem has been added by Western Union Data Services to its Video 100 CRT terminal.

The company will offer the Video 100 for \$86/mo with a manual 202-type modem; \$90/mo with automatic answer modem; and \$95/mo with manual or automatic answer with reverse channel, all on one-year leases.

A pedestal model is available at \$6/mo extra.

First customer deliveries are scheduled to begin in May, from 70 McKee Drive, Mahwah, N.J. 07430.

Net Seminar Offered

A three-day seminar on computer networks sponsored by Technology Transfer Institute (TTI) will be taught by author Leonard Kleinrock this summer.

The basic objective of the seminar will be to acquaint the participant with modern techniques of computer network network design, both from the analytical as well as from the practical point of view, TTI said.

The seminar will be given in Dallas July 19-21; Washington, D.C. Aug. 9-11; and Los Angeles Aug. 30-Sept. 1.

There is a \$485 fee. For further information contact TTI at P.O. Box 35247, Los Angeles, Calif. 90035.

MDS SYSTEM 1200: High key-to-disk efficiency, low key-to-disk price.

Now you can put key-to-disk flexibility in remote locations, for decentralized data entry at reasonable cost.

System 1200 KDS offers the ultimate in price/performance for the multiple-site user. Its shared processor efficiencies allow you to decentralize data entry without dislocating your budget.

The 1200 KDS includes the acclaimed MDS 2491 keystation with tutorial CRT, adjustable keyboard, keystroke job set-up and 125-character page layout. Optional printing and concurrent communications add even more value.

System 1200 handles from 4 to 16 keystations. Up to 256 record formats can be used, with eight chained subformats. All supervisory functions are handled through a

designated keystation, and various statistics on batch status, operators or shift activity may be extracted for operator evaluation and work load dispersal.

Our 1200 KDS does more than improve entry speed and accuracy. User Programmability lets you format for optimum CPU efficiency, too. You get a lot more work through your data center. And your activity statistics will prove it.

Ask your local MDS representative to show you how the low-cost MDS System 1200 makes remote entry practical. Call (201) 540-9080 or write Mohawk Data Sciences Corporation, 1599 Littleton Road, Parsippany, NJ 07054. We'll get back to you overnight.



MDS
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Improves Water Department Service

HOUSTON — A computerized information system enabling any of 310,000 customer records to be retrieved within seconds and displayed on a CRT screen is helping personnel at this city's Water Department provide faster, more efficient service to its customers, the user said.

The system features a network of communications terminals and dual central computers. Approximately 30 terminals are located in the department's Special Services section, which receives more than 1,400 telephone inquiries each day.

The Sanders Associates, Inc. 810 terminal systems operate on-line to dual Honeywell 6068 computer systems with 396K-word core storage and 12 D-191 disk drives.

The intelligent terminals are programmed to emulate the Honeywell 775 I/O line discipline using a software package developed by Sanders.

A total of 36 telephone lines connect to 30 operator positions with six lines available for the "hold" pattern. It can be expanded to 67 lines with 60 operator positions.

A total of 70 terminals are controlled by four dual and one single Sanders control units, each of which handles 16 CRT stations.

The information is transmitted through Bell 201C data sets operating at 2,400 bit/sec at full duplex over unconditioned lines to the Honeywell computer center at the other side of town.

File Displayed

When the calls are received, terminal operators key in the customer's account number on the terminal keyboard and the customer's computer-stored file is displayed on the terminal screen.

If the caller does not know the account number, it can be found within seconds on a microfiche file which contains the customer's name, address and account number.

In addition to the name, address and connect/disconnect data, the information displayed includes meter number and type, type of building, number of apartments, the last 12 months' consumption and other data which provides the Water Department personnel with sufficient information to answer most customer inquiries.

When more information is needed, the Special Services personnel transfer the caller to the research section, where additional terminals enable operators to call up data from the computer and alter it as required.

The Special Services section also has a Sanders printer to provide hard copies of the displayed information when needed.

All program formats are stored in the central computer memory. A special code — "Y" — appears on the first format received by the Special Services operators to indicate whether or not the account is open or work is being performed.

When this is the case, operators can request the next format via keyboard entry.

DII Has OEM Keyboard

BURLINGTON, Mass. — Data Interfaces, Inc. (DII), manufacturer of OEM electronic keyboards and keyboard switches, has introduced a 16-key low-profile keyboard, the Model MK-16F. This keyboard utilizes the DI-100 double cross point switch.

The keyboard is described as suited for computer peripheral controls, point-of-sale and banking terminals.

MK-16F is priced at \$10.50 in quantities of 1,000. Delivery is from stock in moderate quantity and two to three weeks for large quantities.

Data Interfaces, Inc. is at 12 Cambridge St., Burlington, Mass. 01803.

Formats for "connect," "disconnect" and "field service" can also be retrieved and updated by operators. This information is then printed the following day for use by accounting and field service representatives.

Access by Others

The terminals are also used in the Water Maintenance Facilities section for after-hours and weekend access to account information.

Other departments using the terminal network include Accounting, with 15 terminals used to verify all information for final billing, new service and disconnects, and the Collections Department, which uses seven terminals.

"The City of Houston Water Department is a \$40-million-a-year business,"

according to Add Ellyson, assistant director of Public Works.

"With more than 300,000 customers requiring immediate service when they

2,300 a day. Even then we can provide fast, accurate responses to telephone queries and, consequently, provide better customer service," Ellyson said.

The 810 systems replaced an earlier card file system with about 300,000 cards which required 35 operators divided by address.

This system operated with Sanders 720 terminals that had a separate control unit for every three CRT terminals.

Among the benefits of the 810 terminals was a noticeable improvement in employee morale, Ellyson said. Customer complaints about service have also been reduced significantly, he added.

Future plans call for 810 intelligent terminals systems to be installed in the city's tax department and municipal court areas.

Terminal Transactions

call, we had to install a computerized system.

"This system has not only eliminated considerable amounts of paperwork, it has almost eliminated the need to put a telephone caller on hold while someone searched through records.

"This network is of greater value during times when the number of calls can reach



An Easytrieve Coding Form

People write EASYTRIEVE programs in the darndest places. On matchbooks. On napkins. On toilet paper. Anywhere. EASYTRIEVE is the free form, English language information retrieval system for IBM 360/370 hardware. Report jobs are so easy to code in EASYTRIEVE they can be done whenever the inspiration strikes. With other reporting systems, ideas wait for coding forms. With EASYTRIEVE, there is no waiting. It's easy enough

to use that non-systems people like auditors and department managers can code their own report jobs. It is versatile enough for systems professionals to do file repairs, records housekeeping and job accounting.

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NEW PTS/1200 PROCESSING SYSTEM GRANTS "SIX FREEDOMS" TO REMOTE SITES. GET THE GOOD WORD.

PTS/1200



Raytheon's new PTS/1200 distributed processing system gives companies with extensive branch operations new independence from centralized information handling.

The versatile, cost-effective PTS/1200 system allows remote sites to perform their own:

- source data entry and pre-processing, including editing and validating;
- file and record maintenance — creating, accessing and updating locally stored data;
- unattended two-way communications, either in point-to-point or multi-point networks;
- stand-alone batch processing — and disc storage up to 20 million bytes of capacity;
- fast, flexible report printing, in many formats;
- 3270 terminal emulation on-line with 360/370 computers.

Ready-to-use software gets your data up fast — and you can program your own applications easily. The system can utilize up to 24 terminals simultaneously. It reduces computer line costs and forms costs, expedites data retrieval and reports, improves productivity and requires minimal operator training.

A demonstration says it all. To arrange that, write to Raytheon Data Systems, Marketing Department, 1415 Boston-Providence Turnpike, Norwood, MA 02062 — or telephone 800-225-9871 (toll-free). When you build better information processing systems... **the Word gets around.**

INTELLIGENT TERMINALS, MINICOMPUTERS AND TELECOMMUNICATIONS SYSTEMS

RAYTHEON DATA SYSTEMS

RAYTHEON

Contains Reports on 23 Vendors

Auerbach Has User Guide to Remote Batch Terminals

By John P. Hebert
Of the CW Staff

PENNSAUKEN, N.J. — Remote batch terminal (RBT) systems "could now be considered necessary for customers with large central computers so that the computer's resources can be effectively utilized. Large computers dedicated only to in-house processing via hardware links are usually a financial waste."

This is one of the observations made in a 144-page report called "Guide to Remote Batch Terminals" from Auerbach Publishers, Inc. It is designed to assist users in matching currently available RBTs with their computer system requirements, Auerbach said.

Reports and Updates

The publication contains what is said to be an up-to-date product class report, search chart, specifications chart, individual reports on 23 RBT vendors' product lines and updates on 10 products.

Each product report includes an RBT manufacturer overview, the terminal's performance and competitive position in the RBT marketplace and anywhere from one to four or more user case histories.

The reports also cover system design, including data handling characteristics, line transmission specifications and mainframe and Bell System modem compatibility.

HP Announces Two Printers For 2640 CRTs

PALO ALTO, Calif. — Hewlett-Packard Co. (HP) has two printer subsystems for use with the company's 2640 series CRT terminals.

The Model 13246B system consists of an HP 9866B thermal printer, cable and interface card and permits users to make permanent records of the contents of the terminal display and memory, HP said.

The 9866B thermal line printer features upper- and lower-case alphabet characters and symbols and has print capabilities of up to 80 char./line at a speed of 240 line/min, the company said.

Model 13246A System

In addition to the "B" system, HP has introduced the Model 13246A system which contains the HP 9866A thermal printer with upper-case character sets.

Both printer subsystems reportedly enhance the capabilities of the company's 2640 series CRT terminal line, which consists of the Model 2640A and the Model 2644A terminals.

When used with the 2644A, the printer system can also print the contents of mass data storage cartridges containing 220K bytes, HP said.

The Model 13246B subsystem is priced at \$3,675; the Model 13246A costs \$3,295, HP said from 1501 Page Mill Road, Palo Alto, Calif. 94304.

bility; software, if applicable; maintenance availability; and full price specifications.

Rapid Proliferation

"Equipment capable of providing remote batch processing is proliferating so rapidly that traditional [RBTs] are only one approach of many in performing such functions," the guide said.

"Data entry systems, data collection systems and distributed

processing networks have been developed sufficiently to provide for remote job entry applica-

Terminal Transactions

tions and can now be considered competing alternatives," it added.

One of the most prevalent changes in technology affecting widespread RBT design, according to the booklet, "is the widespread use of microprocessors... These microprocessors... use different techniques that may prove more practical in the design of many types of terminals."

The 10 product or manufacturer's specifications updates include reports on Cincinnati Mila-

cron Co.'s RBT entry, Control Data Corp. pricing updates, and reports on the Harris Corp.'s 1600 series.

There are also product updates on Honeywell's Datanet 700, Incooter Corp.'s SPD 904, and IBM's 3770 communications terminals, among others.

The guide is available for \$24.95 from Auerbach, located at 6560 N. Park Drive, Pennsauken, N.J. 08109.

Another "Best Buy" from DDI.

Now, you can pick up the industry's lightest portable terminal for \$1,895. or \$95. per month, including TI maintenance.

At 13 pounds, Texas Instruments' new Silent 745* is half the weight of its predecessor and most of its competitors.

Is a 12 to 20 lb. difference so important? It is if you're the person who's carrying the terminal home or on a trip or from one office to another.

Actually, lightness is just one of the benefits of the 745. It is a 30 cps thermal printing terminal with full capability. Thanks to TI's microprocessor and design simplifications, the 745 offers exceptional reliability. And at Data Dimensions' prices it is, without question, the industry's "best buy."

Data Dimensions' offer is made possible by a new purchase/maintenance agreement with TI. It allows us to provide the full line of Silent 700 terminals to users across the country through a variety of favorable rent-or-buy options. For instance:

1. THE DDI PURCHASE PLAN: You can buy a single 745 unit for only \$1,895., with substantial discounts on quantities.
2. THE DDI LEASE PLAN: For a 2-year lease, the price is \$80. monthly; for a 3-year, \$60. monthly, excluding maintenance. Purchase options are offered.

3. THE DDI RENTAL PLAN: You can rent one 745 for a record low \$95. a month—and that includes TI maintenance. The more units, the lower the rental.

At DDI, our interest is in marketing equipment that offers you a distinct advantage—and gives you a solid reason for doing business with us. Like the 745.

What if you need a terminal other than a portable? We can help you. As one of the nation's largest suppliers of data communications equipment, we seek out the best buys in terminals and modems of all types—and offer you a choice to best serve your needs and budget! Try us.

For more information, write: Data Dimensions, Inc., 51 Weaver Street, Greenwich, Conn. 06830. Or better yet, call (203) 661-1700.



Data Dimensions, Inc.



*TM Texas Instruments Incorporated

SYSTEMS & PERIPHERALS

Bits & Pieces

CRU Meter Upgraded

CLEVELAND — CRU, Inc. has introduced a model of its Capacity Meter that permits users to connect probes to the storage protect pins of a CPU for memory mapping.

Previously probes could be used to monitor WAIT time and CHANNEL use, but did not provide the memory mapping feature of the Model CMO11.

In addition, an oscillographic recorder, which responds to signals of 6- to 10usec, can now be attached to the system, allowing users a more precise insight into the interaction of the central processor and channel activity, CRU said.

The unit is priced at under \$10,000 including the oscillographic recorder, the firm said from 4650 W. 160th St., Cleveland, Ohio 44135.

Okidata Introduces Printer

MOORESTOWN, N.J. — A 132-column matrix printer has been introduced by Okidata Corp. here.

The printer is a desktop or pedestal-mounted model that produces 132 columns of 5 by 7 dot matrix characters at 125 line/min. or 265 char./sec., Okidata said.

The printer sells for under \$1,700 in large quantities.

Okidata is at 111 Gaither Drive, Moorestown, N.J. 08057.

3M Data Cartridge Systems

BALTIMORE — Columbia Data Products, Inc. has introduced a line of 3M-Ansi-compatible data cartridge recorder systems.

The Model 300-S features a computer-grade dual-gap head and a synchronous formatter for read after write and error checking. The price for Model 300-S single track (625K characters) is \$1,495, the 4-track (2.5M characters) is \$1,695.

A buffered unit, Model 300-B, is also being introduced. This unit contains a dual 128-character buffer for asynchronous applications.

The price for Model 300-B single track is \$1,795, 4-track is \$1,995, the firm said from 6655 Amberton Drive, Baltimore, Md. 21227.

Plotting Table Unveiled

WOBURN, Mass. — Concord Control, Inc. has announced the Model 2000 plotting table.

An overall plotting accuracy of approximately .002 inch (.05 mm) and a repeatability of approximately .001 inch can be achieved, the firm said from 6 Cummings Park, Woburn, Mass. 01801.

The printer that

You too can discover peace of mind performance with the Tally Series 2000. Here's a low cost of ownership 200 (or 125) line per minute printer that you can drive as hard as you want without fear of failure. And in the bargain, get outstanding print quality and line registration that never wavers.

Designed to do all day data processing duty, the Series 2000 gives you multiple copies, 132 columns, 2- or 8-channel VFI, numerous character sets and fonts, foreign languages and plenty

By John P. Hebert

Of the CW Staff

In 15-Month Effort

N.Y.C. Developing Accounting System

bridge, who is "on-loan" from the Chase Manhattan Bank and has the primary responsibility for putting the system in place.

The accounting system is subject to city and state laws and federal requirements resulting from loans to the city.

The problem with the old accounting system was that it had "different systems

which were not tied together," Woodbridge said.

Lacked Controls

"They don't even operate with the same software or operating codes. That's how New York was \$3 billion in the hole without anybody knowing about it. It lacked basic controls," he said.

According to Woodbridge, whose specialties include data processing, accounting and two years' experience with the city's Budget Bureau in the Office of Management and Budget (OMB), "much of the city's DP system is undocumented, by modern standards."

The problem with attempting to reorganize the present accounting system is that more time and cost — above the estimated \$17 million to \$19 million projected — would be spent.

Modern System Needed

The city needs "a decent, modern, management accounting system," Woodbridge said.

The present system is "a very complex, archaic accounting system, the end result of which was not to enlighten but to confuse," according to Bill Sharkey, assistant budget director in OMB.

The present system has conflicting fragments controlled by two separate offices — the mayor's office and the comptroller's office, Sharkey said.

Two Budgets

"We tried to attempt tracking of the money system previously, but ended up having two different budgets, the Bureau of the Budget's function and the comptroller's function," Sharkey explained.

The city's payroll system, for example, "was held together by Scotch tape and gum. Right now we can't tell how many employees work for the city," he noted.

The problems the city faces in the coming months are not ones of equipment

(Continued on Page 35)

Controller for 115, 125 Bows

WHITE PLAINS, N.Y. — IBM has announced the 3803 Model 3 tape control unit that allows users of the 370/115 and 370/125 to attach IBM 3420 models 3 and 5 tape drives to their systems for the first time.

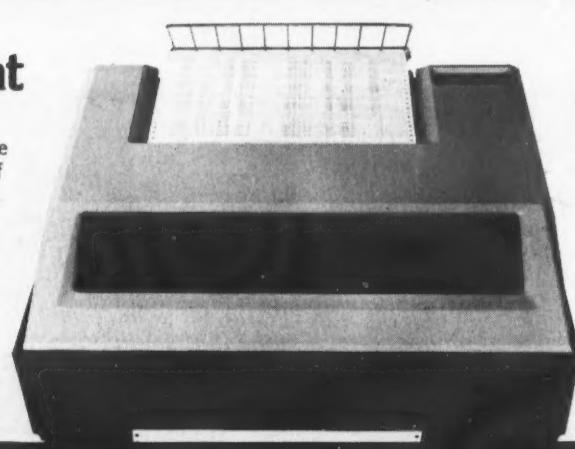
This enables those users to increase the tape data rate from the previous maximum of 80K byte/sec to 120K byte/sec for the 3420 Model 3 and 200K byte/sec for the Model 5.

The controller also increases the maximum number of drives that can be attached to a 370/115 or 370/125 from six

to eight, IBM said. Features allow dual-density (800 bit/in. or 1,600 bit/in.) or 7-track operation of the two 3420 models involved, it added.

The 3803 Model 3 is available for \$686/mo under the Extended Term Plan (ETP), \$817/mo under the Monthly Availability Charge (MAC) plans and sells for \$24,600.

The 3420 models 3 and 5 are available for \$333/mo and \$448/mo respectively under ETP, for \$397/mo and \$533/mo under MAC and sell for \$12,420 and \$16,650.



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of options. And 47 different varieties of interface controllers for a fast and simple hook-up to your system. Contact your nearest Tally office today.

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OEM Sales Offices: New York (516) 694-8444, Boston (617) 742-9558, Chicago (312) 956-0690, Seattle (206) 251-6730, Los Angeles (213) 378-0805, San Francisco (408) 245-9224. Business Systems Sales Offices: Eastern Region (201) 671-4636, Western Region (415) 254-8350.

Profit Squeeze Forces Automation for Cost Savings

By John P. Hebert
Of the CW Staff

AKRON, Ohio — When Goodyear Tire & Rubber Co. here was caught in a profit squeeze, it decided to focus attention on computerizing a manual freight bill audit system, an area where there was large potential for cost reduction.

Only a small percentage of all bills of lading were audited by Goodyear's traffic personnel in the late 1960s, according to Jim Hess, Goodyear's programming manager.

So Goodyear decided to cut out some of the waste and designed and implemented its own computerized freight bill audit and transportation system, he said.

Before full implementation of the transportation information system (TIS) began in 1971, there were 5,000 shipment/day of rubber goods leaving Goodyear's 300 nationwide shipping points, Hess said.

With that large a volume of goods, it was almost impossible to perform a manual audit of transportation charges — only 13% of all audit bills seen by Goodyear's employees were audited. The remaining bills were "just paid" to freight companies, he recalled.

After the decision was made to computerize freight billing, a 14-man team (seven in computer systems and seven in traffic) worked from 1968 to 1971 to whip the system into shape, according to Phillip Antonucci Jr., Goodyear's director of traffic.

Established Data Base

A major part of their job was to establish a "library" of tariffs, or data base, that covered freight rates on more than 100,000 products that are shipped to

Paper Transport Unit Available From CTS

PARAMUS, N.J. — A paper transport system for computer and business machines equipment has been introduced by Computer Transceiver Systems, Inc. (CTS).

The system is for equipment utilizing sprocket-fed paper and forms, the company said.

The system features quiet operation, electronic vernier adjustment to 1/8 line, and adjustable tractors, it said. It can reportedly execute a line feed, one-fourth line feed forward, one-fourth line feed reverse, and slew at 25 line/sec.

Controls on the unit allow the operator to slew paper forward, inhibit paper feed and adjust print line registration, it said.

Separate lines signal the controlling device when each line feed has been executed and when partial line feeds are in process, the company noted.

Interfacing signals are TTL- and DTL-compatible with connections made via a single connector, it said.

The unit is priced at \$266 from the company at East 66 Midland Ave., Paramus, N.J. 07652.

C. Itoh Releases Printer

NEW YORK — The AN-101F from C. Itoh Electronics, Inc. is a parallel-entry, 21-column line printer with a 42-character font.

Print speed, with a two-color inked ribbon, is 72 line/min on 3-1/2-in. rolled or fan-folded paper, the vendor said. Pressure-sensitive paper is optional.

The unit is available for \$350 from the firm at 280 Park Ave., New York, N.Y. 10017.

Manual Describes GP/400

BOSTON, Mass. — A 16-page manual describing the Adage, Inc. GP/400 Graphics Peripheral is available from the firm at 1079 Commonwealth Ave., Boston, Mass. 02215.

70,000 destination points, Antonucci said.

The computerized audit yielded more than \$1 million annually in documented cost savings by eliminating freight bill overcharges, Antonucci said.

"We also reduced costs by taking action after analyzing our data base of shipping operations. This data base helps us make decisions and shipping policies involving such things as routing, commodity rates, consolidations and selecting the right carriers," he said.

In addition to the documented savings, Antonucci estimated the system provides an additional savings of \$2 million to \$3 million since the data base furnishes information to achieve control, analysis and evaluation of shipping activities.

TIS, initially implemented on an IBM 360/50 and now centered around an IBM 370/168, analyzes all outbound shipments to be made by truck or rail from

the company's shipping points in the U.S., he said.

Beyond that, the transportation information system determines the most economical mode of transportation, Antonucci added.

Eliminates Overcharges

To eliminate overcharges, the computer selects the rates and calculates the freight charge on a bill of lading at the time of shipment. This information is stored in the computer, then is compared with the carrier's freight bill when it arrives. When these two sets of figures match, payment checks are sent to the carriers, he said.

Thus, the computer does the chores of rate clerks, who formerly spent days checking charges, and frees traffic personnel to trouble-shoot billing discrepancies, he said.

Now that TIS is fully implemented, and the system, rather than the clerks, does

the auditing, those people are left to do further system design and analysis — the "whats" and "hows" of shipping the goods, Hess said.

There have been enhancements since the initial system was designed in 1968, he said.

Goodyear had also attempted to market the TIS package itself, "but we ran into documentation snags," he said.

"We sold one package ourselves, but felt we didn't have the personnel or time to market it," he added.

For that reason, since Goodyear still felt the system could be used by other businesses involved in heavy traffic, it made an agreement with IBM to sell the freight bill portion of the system, Hess said.

IBM, which now markets the Freight Bill Audit and Rating System, has had "a fair amount of success with the package," selling it to chemical and pharmaceutical companies, he said.



See this product at the Computer Caravan and NCC.

TEXAS INC

Results of 15-Month Effort

New York Moves to Implement Accounting System

(Continued from Page 33)
procurement or software design, Woodbridge and Sharkey agreed.

"We have IBM 360s and 370s all over this place — we've got a lot of power out there — but they are underutilized," Sharkey said.

The various offices and departments "don't want to share the data," Woodbridge said, describing the "traditional independence" on the part of the city comptroller's office and the Bureau of the Budget.

To get its financial house in order, the city has employed American Management Systems, Inc. (AMS) for the systems concept and has retained the services of AMS and Ernst and Ernst for the design and implementation of the systems software, to be ready by June 30, Woodbridge said.

In addition to this, the city is employing the equivalent of 75 full-time accountants and DP specialists. This figure will grow in the coming months to about 100 people on the technical end, according to Woodbridge.

A third firm, IBM, will also be in on the implementation of the system, since the city's mainframes are IBM equipment, Woodbridge said.

Plenty of Capacity

There are no plans to add onto the city's hardware inventory, he said. The city "has plenty of computer capacity."

The key to the system itself will be a data base management system (DBMS), he noted.

There were long debates over whether the system should be based on a DBMS,

he said, but considering the time frame and possible future growth needs, the DBMS was chosen.

Another debate then ensued over whether the city should get IBM's IMS, which was finally chosen, he said.

Political Overtones

"We were concerned about the political overtones of IBM working on the project. We want to make certain that all is above the boards and fair to other manufacturers," Woodbridge explained.

There are additional "special precautions taken by [Chase Manhattan Bank], the city and myself to assure no conflicts develop" so that there is "no way it can ever be said Chase will have inside information," he added.

The question of location of the data

base itself is also political, Sharkey said. "We must have a unified data base that everybody has and nobody has," Sharkey said.

The city doesn't yet know where it will put the data base, which will be run on two IBM machines, a 370/145 and a 370/158, Woodbridge noted.

System Chosen

The system itself, however, is known. "It's best to have a totally integrated accounting system with four subsystems — a budget subsystem for expenditure and revenue data, an accounting and reporting subsystem and payroll and encumbrance subsystems," Woodbridge said.

Within the revenue and expenditure subsystems, there will be a "crosswalk. If you're spending federal money, you have to have it before you can spend it," Woodbridge said, indicating the new system would eliminate present problems.

Within the system will be various categories which will allow the various departments to maintain their own books to see how and where the money is going, he said.

Training Effort

Of course, once it is running, the system will need people to keep it running. In anticipation of this, the city is spending about \$2 million on the training effort alone, according to Woodbridge.

"We'll know who will need to be trained. We also need to have about 25 or 30 city employees staying on with the system after it is implemented, on either the technical or DP end," he said.

Training, however, is possibly the biggest problem the city faces, Sharkey commented.

"At first, every clerk who's putting information into the system will have to be told what to do," he said. Thousands of people have to be trained to use the system.

Impossible Task

"It's damn close to an impossible task" to get the system fully operational within 15 months because of this problem, Sharkey said.

Woodbridge, who is undaunted by problems with training, did agree it would be hard. "We have an enormous task on our hands," he said.

But it isn't an insurmountable problem because "training won't be done in a vacuum," Sharkey said.

Microprocessor Set

For Floppy System

OTTAWA — A microprocessor-controlled diskette storage system which is said to be plug-compatible with all serial asynchronous RS-232C equipment has been announced by Dynalogic Corp. Ltd. here.

The Series 7000 has two I/O ports, both RS-232C-compatible, with individual speed selection from 75 bit/sec up to 9,600 bit/sec, Dynalogic said.

RS-232C Interface

One port can be interfaced to any RS-232C terminal (either CRT or hard-copy printer) and the other port can be interfaced to a data set or another RS-232C port, it added.

Total on-line storage capacity of a Model 7002A incorporating a pair of California Computer Products, Inc. (Calcomp) 140 diskette drives is 630K bytes.

The standard dual-drive 7002A sells for \$3,950, and an optional editor feature is \$495, the firm said from 141 Bentley Ave., Ottawa, Canada K2E 6T7.

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Microdata

Optimizing DP Operations Through Software

April 26, 1976

**A Computerworld
Special Report**



Simple Language Best for Workload Description

CLEVELAND — One of the most persistent problems in data processing is workload description and documentation. Yet even this troublesome chore can be handled, if all concerned are willing to use a simplified language to describe the problem, a U.S. Air Force officer said late last year.

Writing in the September *Journal of Systems Management*, Maj. Richard B. Ensign noted that the need for communication is fundamental to the analysis, design, implementation and operation of DP systems. And, he added, the communications must be based on a common foundation — demands and capacities.

Users are central to a system development and operation effort. Like most of the others involved, however, they have jargon "and other communication inhibitors" of their own, Ensign said.

If analysts are to realize success in their efforts, they must translate user requirements into something meaningful to themselves, to the users and to other specialists who need documentation, he continued.

No Requirement Unique

It is common, Ensign said, for users to view their requirements as unique "and that has been the start of many data system cost explosions or outright failures."

It is "highly questionable, if not wrong" to view any current DP requirements as unique, he said.

Any user application may be subject to time, security, privacy or audit constraints, but these are just demands on the computer system's capacities.

Although the data has distinct meaning to the user, it is like all other data in the system and may be anything from data associated with typical business operations through an array for scientific applications.

Users must be able to describe their requirements in terms of data capture, storage, manipulation and presentation — as demands on the system's capacities. These become a traffic

flow with variations in rates for analysis and design of a system, Ensign said.

Conventional English is too imprecise and various technical approaches already proposed have been too DP-oriented to bridge the gap between user and the DP staff. Instead, there must be a

common thread to tie together all efforts to achieve the design objective, he added.

Users, managers and operators must be able to relate quantitative factors to the qualitative elements such as reliability, accuracy and flexibility when evaluating the system's potential

and its realized efficiency and effectiveness, Ensign said.

Simple Language Needed

If data processing is viewed as a limited set of functions, a simple language "can and should be used as a communication technique or as a stimulus to new development" to relate technological capacities with user needs better than has been done in the past, he said.

Such a language includes two groupings of terms covering administrative and manipulation operations. The administrative terms, in this scheme, are output, input, store, retrieve, generate and destroy, Ensign noted. The manipulation terms are sort, compare, compute and transform.

Explaining the administrative grouping, he said the system "must be capable of presenting outputs through defined ports to defined recipients in specified forms."

Further "it must be capable of accepting inputs from defined sources at defined ports in defined forms."

Time differentials may dictate data storage and retrieval. Data must be captured when and where it is available, though its intended use is at some future time. Media and storage type will be specified, usually influenced by quantities of data to be handled and desired reaction time.

The system may be required to generate data, records or files through internal procedures to accommodate a system demand. Finally, Ensign added, there must be a systematic elimination of data and programs which have served their purposes.

Turning his attention to the

manipulative grouping of terms in the proposed "language," Ensign found that "normally, a considerable amount of DP energy has been devoted to changing the order of data sorting."

This allows data to be captured, stored and retrieved in any order, regardless of its intended final use. In addition to simplifying data entry, this flexibility may well permit "optimization of storage, which is important for the economics and utility of the system," the author said.

Comparison of data against other data and standards, under program control, allows the system to recognize triggers and perform other judgmental functions, Ensign said.

Computation uses either program languages or manual procedures so "its execution is a technicality. Users need only specify the formula or other types of mathematical model and sources of the data for the procedures to be executed in the system."

Beyond computations there are data manipulations which are concerned with ends, the form of data presentation, he said. They require "special talents" and would normally be expected to be on call. Their purpose is transformation: the form of the data must be adapted to media or user capacities.

The verbs Ensign proposed are similar to those of many tools and techniques employed in DP, and that, he said, is "one of the strengths" of this language. It is immediately useful to DP practitioners, yet also relates to the actions of users.

From clerical operations through upper management, user

(Continued on Page S/7)

Package Picture: Rosy or Real?

By Don Leavitt
Of the CW Staff

It's very nearly a cliche to say that DP managers have become aware and concerned about operating costs, in a way they never had to be before the economic crunch of 1970.

But, cliche or not, it's true. And vendors of both software and hardware have responded to that maturing concern.

Many of the claims put forth by the software vendors are impressive. "Improve throughput XX%"; "Cut disk space needed by XX%"; "Boost Programmer Productivity XX%";

It almost seems that — if an installation acquired all the packages that could be applied to a given environment — programming could be done six months before project specifications were finalized and processing handled so efficiently that 28 hours a day would be left over for test runs, long coffee breaks or anything else.

Reality, of course, is different. But many of the packages have helped installations a great deal — if the user's organization understands what their capabilities are and how they should be utilized.

This special report outlines some of the ways in which real installations have optimized their operations through software.

Improved operating systems for the DOS environment, CRT-based replacements for the console typewriter, new sort techniques, center-wide use of scheduling and planning systems and revitalized approaches to remote job entry are among the subjects touched.

Some may argue that this special report paints too rosy a picture of what can be done in optimizing DP operations through software. Not so, really — all we are trying to show is that improvements can be made in many operations. And that they need not be disruptive or too difficult for most installations to consider.

If any of the stories here get one DP manager to seriously consider a new way of doing things, it will have achieved its goal.

Bank 'Cashes In' on Utility, Support Packages

By Don Leavitt
Of the CW Staff

TRUMBLE, Conn. — The City National Bank based here has had the Westinghouse disk/tape Dump/Restore package for four years, but it took a change in senior management about a

year ago to open the way to the data center's acquisition and use of other system support and utility packages.

Described by Dick Laxar, manager of system development, as a medium-sized bank, City National has \$400 million in assets

and 31 branches. It has an IBM 370/145 with 512K memory, half of which comes from ITEL.

Peripherals include four spindles of IBM 3330 and 10 spindles of ITEL 7330 disk space, three IBM 1403 printers and eight IBM 3420-V tape drives,

along with card reader/punch devices.

The system operates under DOS/VIS Release 31, but Laxar said the bank is moving to OS/VS1 "pretty soon."

The equipment is running 24 hours a day, seven days a week although it is unattended on Sundays. Normally there are two operators per shift and, in common with most commercial banks, the bulk of the production work is done on third shift.

Laxar has eight people with him in the system development area.

The Westinghouse package provides a means of backing up — copying — disk files and libraries to either tape or disk. It also supports a method of reorganizing and condensing any system or private library, saving the operators time and effort compared with the use of IBM utilities.

The firm also uses Libra, the DOS partition balancer from Datachron Corp.

Tfast and Dfast, the tape and disk management systems from Oxford Software, monitor the creation, retention and ultimate "scratching" of data sets or files on their respective media. These packages relieve the operators of much responsibility and provide them substantial support.

In essence, these products

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This special report was prepared under the direction of Associate Editor/Software Don Leavitt. Cover art by Cynthia L. Kintner.

Although Measurement Needed

DP Performance 'In Eyes of Beholder,' Users Told

By Catherine Arnst

Of the CW Staff

WASHINGTON, D.C. — "There is a definite need for a measurement tool as a window into the system" Jerry Ely of the Department of the Navy, Material Command Support Activity, said here recently.

"People want to measure performance, but computer performance is in the eyes of the beholder," he continued. Performance could mean the maximization of return on a computer investment, efficiency or a reduced workload, he said.

Ely's discussion was oriented toward performance measurement in an IBM environment. His center has an IBM 370/165 and a 360/65 both with 2M bytes of memory.

The DP personnel are split into an environment group, which handles software, and operations, handling the production end of the center.

Major considerations of performance at his shop are core utilization and response time on the on-line system. "What are you doing for users and what are they doing to you?" were the questions he asked of his system.

Ely's center uses several performance measurement packages. One is System Analysis Resources Accounting (Sara), marketed by Boeing Computer Services, which he said causes no additional over-

head.

"Sara pointed out to us that we had up to 22 hours of WAIT time on some applications," Ely said. "This meant we either needed more core or were not properly utilizing the core we had."

Sara uses a computer resources unit (CRU) rate to measure performance, Ely said. "We would be happy with 175 CRUs per hour; we found we were getting 365 CRUs, but should actually be getting 1,170 CRUs per hour," he said.

Pinpoints Inefficiencies

The Navy center uses Sara to pinpoint inefficiencies and "then we use other packages to trace down the culprit," Ely said.

"When inefficiencies are found, we send out copies of reports after isolating the factors causing them," he continued. Sara is used strictly as a measurement tool to find how well a system is operating, he said.

The Slacmon system monitor, distributed by the University of Georgia, is used by Ely's agency as a system task measurement tool. "It measures supervisory call, I/O interruptions and serves quite a few measurement purposes," he said.

"We use it primarily for CPU utilization," he said. With this package the center found it had a channel imbalance

of 20% which has since been reduced to less than 10%, he added.

"For deliberate fine tuning of application programs that cause bottlenecks," Ely uses Alert, marketed by Comten, which he described as "a very good tool."

"It produces over 40 reports, gives a narrative of what the report is, why it is needed and how factors involved can be improved," he said.

With Alert, the center found programmers did not use large enough blocking factors on tape files; the required number of records block was raised to 10 "and that helped," he said. Excess direct space allocation was also discovered and the center was able to save "several" 3330 disk packs after correcting the problem, Ely said.

Another measurement tool used by Ely is Time-Sharing Option (TSO) PAP, which utilizes TS Trace "and which produces some very good reports," he said.

With this tool, "We were able to take away one of our three regions, save 164K and take on one-third more users," he said.

Control IMS from Boole & Babbage is used by Ely to give many different types of measurement reports, he said.

"We have 90 lines, 200 application programs and four message regions. When we moved from 65 to the 165, we knew we had to make improvements on the 65 to

keep it on the same response level as the response time on the 165," he said.

Control IMS provides information on the individual application program transactions, Ely said. "It provides a breakdown on the individual data bases, the number of transactions, the data base I/O activity, key and nonkey reads and writes and it will produce charts on response time so we can find out what happened," he said.

Control IMS gives a measure of every area of performance on a terminal, Ely claimed. "It can determine what lines are not being utilized and pinpoint the number of lines and terminals that are very inactive," he said.

Eleven terminals were found with Control IMS that are hardly ever used; these were changed to dial-up which saved approximately \$5,000 per year, he said.

"We also took 10 lines off rotary so they would be available for future growth," he said. "It's been very worthwhile."

There are many other packages on the market, but Ely said he "can't find one general-purpose software measurement tool."

"If you have the personnel, you can design your own; otherwise use outside packages," he suggested.

But he stressed that if an outside package is used, a staff member should be dedicated to working with that package.

"We have just established a computer performance group consisting of two programmers and a clerk. We found you have to dedicate a person to working with the packages or you won't get full utilization.

"All our packages have been paid for many times over," Ely concluded.

Bankers 'March

By Don Leavitt

Of the CW Staff

SAN FRANCISCO — Crocker National Bank acquired and began to implement the Deadline scheduling and resource management package from Tesdata Systems Corp. in October 1974.

By October of this year, the implementation "should be just about complete" both here and in the bank's northern data center and at a Los Angeles site as well, Larry Winkler said recently.

The move to complete use of the package at both sites has taken longer than the DP officer and production manager expected. But he is still pleased with the results he has achieved.

Since "just about all schedulable activities" here have been put under Deadline, Winkler — and every other manager — has a common pool of information.

"We've begun to march to the same tune" with a better understanding and appreciation of how each of the pieces must fit together to make a good operation, he said.

Scheduling of jobs to be handled within the computer itself is part of Deadline's capability. With a pair of 370/158s and a multiprocessor 168 configuration, 40 spindles of IBM 3330 disk space and "27 or 28" tape drives, that part is extensive, "but it's probably the easiest part of the whole thing," Winkler said.

The hardware scheduling is far more quantifiable than the planning required to get all the peripheral activities — which are largely human-oriented — running in concert with each other.

Outside Events Vital

Yet it is specifically the ability of Deadline to take all those "outside" activities into account that has made Deadline so useful here at Crocker, Winkler said.

The package can work from its files of job descriptions, including how often they are to be run and when they must be completed, and update its estimate of how long the jobs take with job accounting information from the operating system.

All current information about the outside functions, when work reaches each point in the system and how long it takes there, must be entered by the people

to Same Tune' With Package

involved or the whole system becomes weaker and less reliable.

"Reliability" is apparently a key word in connection with any package like Deadline. "A schedule is only a plan. It can't take into account the unexpected. Our use of it must not be rigid, but firm enough so that, when things happen, we know where we stand and what has to be done," Winkler said.

There are 400 to 500 people employed in operations at this Crocker data center, including drivers of the trucks on courier runs, he said, and 25 areas of responsibility are scheduled through Deadline.

These extend all the way from input distribution at the start of the production cycle to output delivery to branches and bank management at the end of the same cycle.

In common with most commercial banks, Crocker is essentially batch-oriented in its operations, providing overnight turnaround to some 350 branches throughout the state. There are on-line inquiry capabilities available to six of those branches on a pilot test basis, with full service to all branches expected later this year.

Attempting to optimize an operation of such dimensions — "and optimizing really means pushing the system as hard as seems reasonable," according to Winkler — is "an exciting area." Deadline has provided some benefits that were expected and some perhaps that came by chance.

No Jobs Overlooked

With the package's internal calendar of when in the next 18 months jobs are supposed to be run, none are overlooked — "which sometimes used to happen" — and reruns, required because jobs were run out of phase with other steps in the production cycles, have been cut back.

But the ability to automate the descriptions of jobs outside the computer itself has meant, for example, that addresses for pickup and delivery points along the courier routes are not stored in a clerk's desk. They are in Deadline's file, and the system's output includes a pickup list and "mailing labels" for the output.

A decision to use OS job names

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Measurement Tools Must Reflect Corporate Goals

By Molly Upton
Of the CW Staff

DETROIT — Measurement tools should reflect the needs of the user's overall corporate structure, according to Charles M. Fitts, manager of management information services (MIS) for The Budd Co.

Criteria for selection of measurement tools can be made only after a scheme of the organization's mode of operation is examined.

To be meaningful, these measurement tools will play an integral part in the DP department's efforts to assist the corporation in realizing its goals, he said.

To arrive at selection criteria for measurement tools, Fitts told attendees at the Computer Caravan here recently they should first define the corporate environment with which the MIS function has to be compatible.

Then MIS objectives and structure can be established, after which the building

blocks of planning, problem solving, decision making and controlling form another layer in the pyramid.

After the basic blocks are defined, one can decide what to measure, when to measure and what actions to take. After this, decide how to measure, whether by software or other means, he said. Measurement is the top block of the pyramid, Fitts noted.

Taking The Budd Co. as a case study, he explained how the DP structure and objectives are integrated into the business process of the corporation.

The MIS function reports to the financial vice-president, and policy guidance is provided by an officer-level steering committee, he said.

Budd has central authority over four major DP centers with IBM 370/135s as well as sites with smaller systems, he said.

At Budd, the planning procedure starts with corporate goals, and these are re-

flected in a corporate five-year plan.

The MIS department surveys user requirements and compiles a project portfolio to satisfy these needs.

Then an MIS two-year operating plan is drawn up to support the development of these projects, and an estimate is made of charges to user departments, Fitts said.

From this an MIS budget and a five-year plan are created.

This MIS five-year plan, in turn, is placed in the corporate five-year plan next year, he said.

From this planning cycle several features of what the MIS program was going to be like became clearer, and each area showed a need for measurement.

For instance, the firm was making a large commitment to a major system development program, which required project performance information. Budd chose the Project Analysis and Control System (PAC/1) from International Systems, Inc.

The firm was also developing on-line capability with CICS, with meaningful applications scheduled to be up by 1980. To ensure system performance, Budd uses a job accounting system by Westinghouse.

Since all these increases indicated a rising MIS budget, Budd selected the gen-

Avoiding CICS Snags

DETROIT — Installing the on-line CICS from IBM can raise some real questions about calculating charges to user departments as well as how to get a CPU with VS functioning efficiently, users at the recent Computer Caravan here indicated in discussions.

The mix of jobs on a 370/135 with VS has a serious effect on the performance of CICS, observed Jack Matthes, manager of the Detroit data center for The Budd Co.

He said he has learned not to put general ledger processing and a compile on at the same time.

One user with a 370/135 using CICS with 192K said he can run only one partition if he wants decent paging rates, while Roger David of Central Soya said his 135 runs OK with CICS, but it has 512K bytes.

Matthes said 5:1 is a good ratio between the active and inactive clocks for jobs run on his system with CICS.

Budd now bills users for a straight rate based on partition time. For CICS users he is thinking of billing at five times the active clock time.

However, he said he cannot really recommend this scheme since the active clock time is increasing as a reflection of tighter resources with more jobs going on and more paging. Thus it could be overcharging if the system suffers degradation.

Ed Oljace of Borman's, Inc. said he was looking for a way to bill his on-line users since if he billed at the normal rate of \$40/hour for his 360/40 it "would annihilate the user department."

eral ledger system from Software International to aid in chargebacks to the user departments.

Selecting a Package

To select a particular package, the important factors within each area are assigned priorities, and these are matched with the software orientation of particular packages.

For instance, project management is comprised of factors such as project cost and performance, user charges and manpower allocation.

The software orientation of such packages may be focused on cost accumulation, task control, project planning or project evaluation and review technique (PERT), he said.

Currently the department takes the forecast of everything in next year's operational budget, including CPU time, salaries for systems analysts, programmers, data entry people, etc., and divides this by the number of partition hours forecast. This gives a rate per elapsed hour, he said.

Having this data enables the department to charge users for particular applications. PAC/1 also gives information on the utilization of manpower, he said.

By tracking charges, the department is able to exercise some control over what facilities are being used for certain jobs, he said.

Fitts told attendees he has found installing measurement tools can be "an opportunity to eat the bread you bake yourself." This is not always easy or pleasant, he remarked.

The effect of installing PAC/1, for example, was a nightmare — "It opened our eyes and gave us the perspective to see how bad a job we were doing."

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BY JASPER

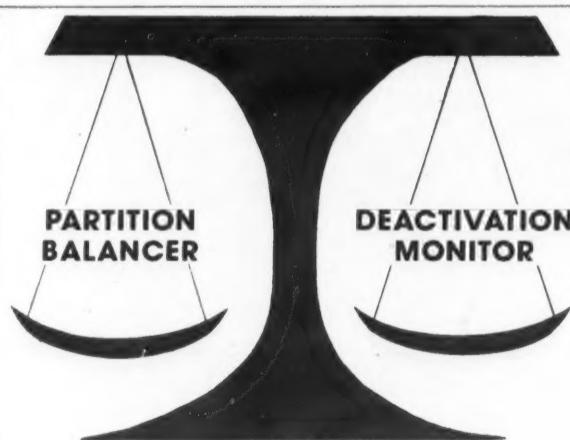
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Two Extremes Experienced

Bank Finds Impact of Tuning Varies With Problem

By Don Leavitt
Of the CW Staff

HARTFORD, Conn. — Sometimes an optimizing package can do completely incredible things to improve the way a program runs, but in other situations it can't do much at all, according to Gary Boulay, assistant vice-president of Connecticut Bank and Trust Co.

Boulay saw both extremes when his staff ran the Cotune package from Capex Corp. against some of the bank's own systems. And "the extremes are reasonable once you know the programs involved," he said.

In one case, Boulay's technical assistance staff cut a production run from 10 hours of wall clock time and "just over an hour of CPU time, to 1-1/2 hours of wall clock time and a proportional cutback in CPU time. This reduction in run time occurred without sacrificing any of the application logic of the program, he added.

In another case, Cotune was run with a pair of programs the staff felt were running properly and "about as efficiently as they could."

The output from Cotune in effect confirmed that impression and showed no way in which those particular programs could be optimized significantly.

'Our Share of Problems'

The bank acquired Cotune last year partly because the workload it was running on a pair of IBM 370/158s included a number of different systems and "our share of problems."

The reports on the programs Boulay thought were good confirmed that he needed to focus on the bad systems, so those reports were just as meaningful to him as the ones that led to the drastic improvements in the first instance.

The Model 1 158s now in place each have 2M bytes of memory; in June the configuration will be upgraded to a multi-processor 158 based on Model 3s with 6M bytes of memory between them.

The operating system is to be converted from SVS to MVS, Boulay added. The data center runs 24 hour/day, five days a week and another 18 hours on Saturdays. He's looking for all the performance improvement he can get.

The upgrade to Model 3 158s "should give us 10% to 15% improvement," and a range of software tools should do even better, he said.

Cotune is designed to report how the user's Cobol program is executing in terms of source code statements. It highlights areas that might benefit from review by the programmer, but it does not make any changes by itself.

As Boulay explained the process, the programmer compiles the program with Cotune in effect attached to the compiler. This creates a data set out of what would be the output source listing, and it implants in the user object code its own counters to keep track of what parts of the code are used during execution.

The application program is executed — "preferably with your own live data; that creates a real situation," Boulay noted — and a special output is then run through a postprocessor program.

This creates a report on what happened during the test and provides the basis for possible recoding efforts.

The report shows, first, what statements were not executed at all — without identifying why this is true. Next, Cotune lists which of the procedure division paragraphs were executed most. That may well show where work should be concentrated to provide the greatest improvement.

But large amounts of time spent in a single part of the program may not represent a problem at all, Boulay said. He

recalled one program that spent 50% of its time in one statement.

"But that was a call to print subroutine and, since the program was a reporting run, this was not unreasonable. You should expect it to spend most of its time printing."

On the other hand, the report for the program that was finally so drastically cut down showed where corrections were needed and gave Boulay's crew clear indications of how the code could be changed, without altering the program's basic logic.

Shows CPU Percentage Time

In addition to showing how many times each statement in the program was executed, the Cotune report also shows the percentage of CPU time each statement

utilized. That was the basic clue, the bank found.

Sharp differences in the CPU time used could occur between consecutive statements even though both might have been executed the same number of times, and the differences were reflections of the object code generated by the initial statements, Boulay said.

Arithmetic instructions, for example, "were generated with an awful lot of code," he said, including convert to binary, convert to decimal instructions which take time to execute, imposing a high overhead. These were the areas the bank focused on in particular.

But the analysts found other things as well, some of which had nothing directly to do with the programmers' choice of source code. "It so happened (in the

10-hour job) that when they compiled the program they let it default to 360 mode, which meant the data fields had to be aligned" on word boundaries.

But the fields were not aligned during program development so the object code had to move them to where they were aligned — and that required a lot of generated code.

"It also happened that our compiler had a trunc option instead of a notrunc option, and that generated more instructions, too."

Right Tools Needed

The overall effort to bring the monster down to size required only 1-1/2 man-days "plus a day and a half I spent looking at the output," so improvements

(Continued on Page S/6)

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(WHEN YOU'RE READY TO GET OUT OF THE STONE AGE)

Improves Throughput, Response Time

'Bottleneck Principle' Balances System Load Properly

By Dr. Jeffrey P. Buzen

Special to Computerworld

One way to improve the throughput or response time of a computer system is to redistribute the load on the I/O devices and channels within the system until the load is properly balanced.

In general, proper balance is achieved by reducing the load on heavily utilized devices and increasing the load on lightly utilized devices.

However, proper balance does not necessarily mean equal utilization for all devices, and in many cases performance is optimized by overloading certain devices and creating bottlenecks within the system.

To explain this point further, suppose two disks are involved in a load-balancing operation. Assume that the faster disk

requires an average of 40 msec to read or write a record, and assume that the slower disk requires an average of 80 msec for such operations.

If the faster disk is assigned twice the load of the slower one, the faster disk will process twice as many read and write requests, but each request will take half as much time to carry out.

Thus, the utilization levels of the two devices will be identical and the system will appear to be balanced.

However, a system which has been balanced in this way will not be performing optimally. That is, system throughput and response time can be improved by shifting more of the load to the faster device so that it is doing more than its fair share of the work.

In such cases, optimal system perform-

ance actually occurs when the faster device is overloaded in the sense of having higher utilization, more requests waiting for service, and other bottleneck characteristics.

Bottleneck Principle

This is an example of an important result from the theory of performance tuning called the Bottleneck Principle: Bottlenecks are often essential for optimal performance, and the purpose of load balancing is not to eliminate bottlenecks, but rather to create them at the faster devices.

The mathematical proof of the Bottleneck Principle is too complex to present here, but this result has been known to queueing theorists for a number of years.

At an intuitive level, it is relatively easy

to see what is going on. Since faster devices are more efficient, they ought to be used more heavily than slower devices, and thus their utilization levels should be set relatively high. This in turn causes the faster devices to appear as bottlenecks within the system.

Just what should the utilization levels be for optimal performance? This is a difficult question to answer in general, but a rule of thumb called Chen's Rule works well in many cases.

Chen's Rule is to adjust utilization levels so that the fraction of time each device is idle is inversely proportional to the square root of the speed of that device.

As an example of Chen's Rule, suppose we are balancing the load on two devices whose speeds have a ratio of 4:1. The square root of this ratio is 2:1, and thus performance is optimized when the fraction of time that the faster device is idle is equal to one-half the fraction of time that the slower device is idle.

That is, optimal utilization levels for the faster and slower devices are: 90% and 80%, 75% and 50%, 60% and 20%, and so on. Tuning is carried out by moving data files from one device to the other until one of these optimal ratios is achieved.

Chen's Rule is only an approximation and does not apply in all situations. Thus, it is important to have a thorough understanding of a system before undertaking load balancing or any other type of tuning.

The rewards of a tuning project can be extremely high, but unexpected results such as the Bottleneck Principle have been discovered in a number of cases. Anyone working in the performance tuning area should be prepared for a number of surprises along the way.

Buzen is vice-president and director of computer performance evaluation for BGS Systems, Inc. in Lincoln, Mass.

Firm Finds Impact Of Tuning Depends On Nature of Problem

(Continued from Page S/5)
can sometimes come rather easily "if you have the right tools."

Another tool Boulay said he likes is the optimizer, which the bank also acquired from Capex in 1971. This package attacks the problem from an analysis of the object code, sometimes with surprising results, he said.

The optimizer "studies" the logic paths of the object code once it has been loaded into the CPU and it eliminates all the generated code that cannot be used.

Normally this involves the dummy exits provided at the end of each paragraph, many of which are not used if the logic flow always goes from one paragraph to the next.

In one case, however, Boulay came across a program that didn't seem to be working as expected. As with all bank programs now, this one had been run through the optimizer as part of compilation.

A dump of the program as stored in main memory showed that no code existed for about 175 statements from the middle of this 300-statement program. The bank was sure this was an optimizer problem and contacted Capex. The vendor urged Boulay to review the program logic to be sure the optimizer had erred.

That review showed that there was, in fact, no possible way to get to the 175 statements. The optimizer "already had figured that out," Boulay said, "so it simply eliminated the generated code," and left the bank with the realization that the problem lay somewhere else and not in the optimizer.

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Enhanced Efficiency for Small Machines Often Ignored

By Peter L. Ruscoe

Special to Computerworld

In these halcyon days of more computing power for less and less money, a phenomenon attributable largely to the advent of the minicomputer, little attention has been paid to the need for improvement of small-machine installations.

It might reasonably be considered that the relatively low monetary value of, say a 5% improvement in the efficiency of the "turnkey" DP department would not justify the cost of a study.

Another reason given for the reluctance of some minicomputer and small-mainframe users to pursue improved efficiency is that, while the machine is being used for on-line transaction processing, throughput is said to be limited by operator speed.

Even those who accept this as an irrefutable fact, and evidence shows that in many cases it is no such thing, should realize that there is probably room for considerable improvement in the ancillary activities of the department, not directly related to machine speed or capacity.

Specialized Needs

It must be accepted that the needs of a small-computer user in the area of efficiency enhancement are somewhat specialized and often do not fall in the same realm as those of the large-mainframe situation.

Within the mainframe sphere, a considerable quantity of sophisticated, and in many cases expensive, hardware and software measurement tools have been produced. None of us would pre-

tend that a user could justify \$30,000 worth of measurement tools to tune a \$30,000 system.

It is best, therefore, for the user to confine his attentions to study in the areas where specialized equipment and knowledge are not required: choice of operators, machine scheduling, shifting requests for management reports, etc.

There is no doubt that some systems have been designed and built for small computers in a way that can only be described as "faulty."

However, in this area, most producers are learning by their mistakes, and while some such systems still exist, many have been redesigned because of expected obsolescence.

There is, however, still room for improvement. Transaction processing requires careful file design and mass-storage allocation, for example.

Specific Techniques

Techniques, too, tend to be specific. For example, a five-minute sort may be perfectly acceptable in the middle of a long batch run, but totally disastrous during, say, on-line order processing.

Happily, simple systems and programming techniques can prevent such gaffes, but how many of us in the software world can really claim, hand on heart, that every system we have designed has been fully appropriate to the machinery and the user's requirements?

It is well to look at the areas of a small user installation which might benefit from a closer study.

• Are the operators both competent and suitably trained? Are they motivated, or should they perhaps only work on the machine for, say, 12 hours per week, exchanging with other trained staff members?

Do they understand the company as well as the job? As everyone will agree, the fastest key operator can only be efficient with on-line working when the data is extremely accurate, and how often is this case?

• Is the work demanded of the machine appropriate to its nature? The type of environment I have outlined is described by the term "transaction processing," and the further away from processing transactions that the applications stray, the less efficient will the machine become.

• Do the staff members know how best to recover data after a serious error, and could they do it quickly? Is as much of the system as is feasible stored on a minimum of disk space?

• Has the system been designed to use its core storage in the most efficient way for this particular system?

• Does the data travel to and from the computer department smoothly and efficiently, or do inquiry requests appear written on the back of cigarette packets?

• Has the work on the machine been scheduled in such a way as to minimize, for example, printer contention? This is not a difficult goal to achieve, but it should not be undertaken in a slapdash fashion.

At this point, a criticism might be leveled that all the above suggestions are a waste of time without adequate measurements

before and after changes.

Generally speaking, the effect of improvements can be seen in terms of speed of response, operator satisfaction and throughput.

Naturally, a user who is especially interested in improving efficiency can apply a stopwatch to every process, but my discussions have centered on the fact that the cost-effectiveness threshold is fairly low for a small installation, and the value of an in-depth study is limited.

Many small users may be cynical of the improvement which can be expected for their installation, but it is a fact that minicomputers have been neglected in the past when efficiency has been discussed.

Indeed, in many cases, replacement of the hardware has been

recommended after only a cursory examination of the problem — a little like amputation of a leg because the doctor's bill for treatment would be more than the cost of an artificial limb!

We should remember, then, that if a minicomputer is inexpensive by the standards of some years ago, then surely it is worth taking seriously the suggestion that a reasonably well-tuned DP department using a modern minicomputer can produce a level of productivity for a given expenditure well above that planned in a company's budget.

If this is the case, then it must be an easy-to-achieve, but highly desirable objective for any computer professional.

Ruscoe is director of ACS America, Inc. in New York.

Simplicity Best to Describe Workload

(Continued from Page S/2)
activities may be described as combinations and sequences of these verbs. The language allows macro-level narrative of systems and is appropriate for block diagrams, conventional flowcharts, matrices and simulation techniques, Ensign added.

The proposed language's quantitative description, in terms of DP capacities, allows discrete specifications, he said. It also allows for development of accurate benchmarks. In fact, "the simplicity of the language should allow for the development of standard benchmark programs for DP systems," Ensign said.

Similar things have been proposed and used in the past, he said. The difference is that Ensign's approach is based on a user-oriented language that extends the communication "all the way across the spectrum of people involved," he said.

Matching Made Easy

By developing definitions of user needs in his 10-verb language, Ensign even foresees the possibility of matching software package capabilities with demands more easily than has been possible up to now.

Above all, "the most important attribute of this language is that the entire system development can be traced, correlated with objectives, economized through trades of costs against capacity and the results measured by

users — it can be managed," Ensign concluded.

The journal in which Ensign's

article appeared is published by the Association of Systems Management in Cleveland, Ohio.

A 10-Verb Language

• **Output.** A requirement to present some data element or set of data elements as formatted in a report. The output can be from a component or subsystem in the system being described to another subsystem or to another system outside of the one being described.

• **Input.** A requirement to accept some data elements, or set of data elements or instructions, from another subsystem or from a system other than the one being described.

• **Store.** A requirement to file data or records, according to a common key, and programs or routines, by name, specifying the media or type of storage. This includes return, replacement and additions to storage.

• **Retrieve.** A requirement to "call" (synonym) some data or records, according to a common key, or programs or routines, by name, specifying the medium of presentation.

• **Generate.** A requirement to administratively establish a record or file including standard techniques to generate a random number table.

• **Destroy.** A requirement to eliminate data or records from an active file, or the file itself, such as procedures for destroying documents or purging magnetic storage devices.

• **Sort.** A requirement to reorder data or records, according to a common key, handling data or records that have been input or retrieved.

• **Compare.** A requirement to calculate the result of data elements being entered into a formula or equation, when both the data and the formula have been either input or retrieved. (Normally, computation is the result of a locally programmed application program.)

• **Transform.** A requirement to change the form of data, as that required or allowed by various media or that resulting from statistical and mathematical techniques by which quantities of data are reduced to a simpler form. This includes encoding and decoding. (A level of complexity that is normally expected to be packaged, off-the-shelf software; the work of specialists; or specialized hardware modules.)

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Improves Throughput

Sort Package Helps User Stick With Current Hardware

By Don Leavitt
Of the CW Staff

BOISE, Idaho — "We're looking for a way to stick with our current hardware because of its cost/performance, but I'm not sure we can get the throughput we need in view of scheduling problems."

The speaker was Larry Nelson from the DP staff of Albertson's, Inc., where he is assigned to researching the problems of teleprocessing and getting ready for the company's first remote job entry (RJE) operation.

The problem he described has a familiar ring to it for many a DP manager.

Albertson's is a food retailer with 254 supermarkets spread across an L-shaped area, including all the states in both the southern and western parts of the U.S. It is also becoming heavily involved in

wholesale food distribution from four warehouses and in a joint venture with a drug outlet from 50 more stores.

The hardware to which Nelson referred includes a pair of IBM 360/50s, each with 512K bytes of main memory and sharing seven spindles of ITEL 7330 disk storage. While the disk sharing is automatic, the system provides for operator-switchable channel controllers, he noted.

One of the systems has three IBM tape drives; the other has three equivalent units from ITEL. Each of the systems is running under OS, and Albertson's has 10 to 12 programmers and system people supporting the operation.

Albertson's acquired the Pansort sorting package from Pansophic Systems, Inc. about a year ago. The company selected this package after trying several others

"simply because it seemed to give the best cost/performance ratio," Nelson said.

30% Less CPU Time

Pansort — now marketed by Standard Data Corp. as CA-Sort II — has worked well at Albertson's, he said. Although the improvement varied from sort to sort, it has been "in the neighborhood" of 30% less CPU time "and that's not a bad neighborhood," the spokesman noted.

The elapsed time has been reduced in proportion to the CPU time change, he said, adding that Pansort is more efficient in its use of disk space as well as CPU time.

Confirming Nelson's report of the improvement in sorting operations with the independent's package, Galen Haar, Al-

bertson's supervisor of operations, said Pansort "allows us to get by with only three sort work areas on disk, instead of six, and that's a help right there."

Primary Applications

The primary applications for the company are order entry, warehousing, accounts receivable, accounts payable and payroll — "all the usual stuff," in Nelson's view. The work is done in batch mode, but the home office here is in direct communication with some of the supermarkets via MSI transmission units, and indirectly with the four wholesale warehouses via Mohawk Data Sciences 2400s.

The company has Panvalet, also from Pansophic, for source statement library management.

It has considered other software packages designed to optimize the DP operations, but hasn't acquired any of them. It is looking at some of the Boole & Babbage products now, but is "not yet really serious about them," Nelson said.

The systems are used "about 70% of each day," he estimated, but they are manned and available around the clock in an effort to leave time to handle orders as they come in and are made ready — presumably during the day.

Scheduling packages wouldn't help this situation, Nelson said, "because we're so much on a real-time turnaround basis. Even though we operate in batch mode, we want to go as soon as we get input."

Although orders for canned goods and the like could logically be accumulated and run at one time, calls for produce and meat are extremely time sensitive: they can't wait around the data center.

To improve the center's ability to handle orders, Nelson is looking at the IBM 3704 front-end communications controller "or at that type of gear" for teleprocessing. But that doesn't necessarily mean a move to 370 equipment, he said.

Nelson seemed somewhat doubtful the 50s can handle the load once all the supermarkets are on-line. Nonetheless, in view of their present loading and Albertson's demonstrated willingness to use independent hardware and software when appropriate, it seems likely Nelson will find a way to stick with essentially the current hardware for some time to come.

Scheduling Package Helps Bank Managers March to Same Tune

(Continued from Page S/3)

Winkler said.

As one example of the "marching to the same tune" he had mentioned earlier, he said this decision has helped communications between the various work centers.

"If a problem crops up in 'DDA195' anywhere along the line, everyone knows clearly if his or her job may be affected. Before this, data entry's name for a job often was completely different from the computer room's and from quality control, so no one was immediately aware of developing problems."

No Rerun

Unlike some data centers, Winkler does not rerun the scheduler even if a serious problem — a machine failure, for example — occurs.

The problem, he said, is that with 5,500 tasks, it takes 45 to 50 minutes to run Deadline, "and if we've already got a problem, we can't afford that much extra time to get confirmation of what we can already see from the schedule originally set up for the day."

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The Software Manufacturer

Monitors Point Out Problems, But Offer No Cures

PHOENIX — Software monitors have become one of the most commonly used — and one of the most successful — methods of evaluating computer system performance.

But use of these tools can only show that a problem exists (if it does) and not how to cure it, a recent issue of *EDP Performance Review* (EDP/PR) warned.

Devoting the February issue of his newsletter to an evaluation and comparison of software monitors, EDP/PR Editor Phillip C. Howard noted they are "relatively" easy to use, "generally" inexpensive and cause "very little disruption" to system operation.

There are a number of proprietary systems on the market today, mostly for IBM systems under OS and VS, "but a significant number of users have built their own home-grown versions," he added.

Job accounting packages and program analyzers were excluded from Howard's definition of software monitors. Instead he focused specifically on programs characterized by "hooks" into the operating system that provide for the collection of measurement data.

This usually implies a change in the operating system, Howard said, requiring "a small amount" of additional memory, "some" CPU overhead and often a tape or disk file on which to record the data collected.

Outputs are generally systems-oriented, providing information on overall performance rather than on individual programs, he said.

Even with this definition of software monitors, EDP/PR identified and included on comparison charts some 19 separate packages, including software for Burroughs Corp., Univac, Control Data Corp. and Honeywell Information Systems equipment, as well as 15 packages for IBM gear.

Why Users Monitor Systems

There are a number of reasons why users monitor their systems, but they usually relate to a desire to save money, either through the release of equipment, reduction in operating hours or the postponement of new equipment. But a sensed need to better understand the system and to provide data on future developments and trends also fosters use of these tools, Howard said.

In more specific terms, he said there appear to be six major reasons why users monitor their systems:

- Optimize the configuration.
- Improve throughput.
- Investigate resource utilization.
- Determine character of workload.
- Improve response time or turnaround.
- Provide data for system modeling.

One of the primary objectives of any performance evaluation activity is to make sure the configuration is properly balanced with respect to the workload, Howard explained. In particular, users want to avoid bottlenecks on any individual system resource that tends to constrain total system throughput.

In some cases, the user's incentive may actually be to release equipment, thereby providing direct dollar savings in monthly equipment expenses, Howard added.

Some reconfiguration may result if the monitor is used primarily to improve throughput, but only if the configuration change supports the goal of getting a given workload done in a certain amount of time.

With this emphasis, users are searching for ways to eliminate backlogs, reduce hours of operation or get rid of the problems of peak load periods, rather than just balancing the system.

Users concerned with the capacity of their system and its ability to handle future workloads may monitor to find out just how heavily their present con-

figuration is utilized, Howard said.

Management is interested in both the theoretical capacity of the system and the level of use of that capacity. This type of knowledge helps in projecting future requirements; in planning for future growth; and, after a change, in determining whether the performance predictions made for system upgrades were valid.

Knowledge of workload characteristics is also required for management planning purposes, particularly as it relates to the evaluation and selection of future equipment, EDP/PR noted. Workload characterization is also important in estimating the impact of new applications, Howard said.

Monitoring, in conjunction with job accounting information, can provide additional intelligence in this area, he remarked.

Increasing emphasis is being placed on the fulfillment of service obligations to

the end user. Among other things, response time and turnaround time are two of the major service criteria used to measure the DP department.

Software monitors can provide insights into system scheduling, peak loading situation and queuing problems, all of which may impact how well an installation meets these criteria, the newsletter said.

In addition to knowing what software might accomplish, there are a number of characteristics they tend to share that are important for any installation to consider, whether selecting a commercially available package, deciding between hardware and software monitoring or attempting to build a software monitor in-house, EDP/PR said.

Cost has to be a consideration, but even the highest priced software monitors "are not particularly expensive" compared with the total cost of running a large-scale data center. They are also "considerably

less costly" than all but the simplest hardware monitors, Howard added.

The overhead imposed may cause some distortion in the measures being made, "but these are seldom significant. Perhaps the biggest danger is that the resources required by a software monitor will be enough to prevent some problem program from being allocated, thereby altering the job mix being monitored," he said.

Software monitors have the capability of extracting "qualitative" information directly from operating system tables, and this means they can report on some aspects of performance that are beyond most hardware monitors.

But they may have trouble reporting on device usage if the collection of such data is beyond the predefined scope of the software logic, EDP/PR added.

Although the accuracy of software monitors is "generally good enough" for

(Continued on Page S/10)

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Railroad's Package Ups Programmer Productivity 30%

By Don Leavitt
Of the CW Staff

OMAHA, Neb. — Early in 1974, the Union Pacific Railroad needed a system which would enable its programmers to do more work and to do it faster. Now it has it, according to Dick Meradith, who was responsible for selecting and justifying the acquisition.

The railroad has two IBM 370/155s and a 360/65, all running under OS/MFT with Hasp. Interfacing that hardware and the user departments' needs is an 80-programmer staff.

Traditionally, program development here had involved recoding at the programmer's desk with source deck changes handled (along with all the other work) in the keypunch section.

Updates were submitted to a library controlled by Panosphic Systems' Panavet, compiled and printed — a process that gave one- or two-day turnaround,

Meradith said.

In a move to improve that situation, a card reader/printer was moved to the floor with the programmers. Turnaround improved "dramatically," but in six months the programmers found they were using all their time doing program development, with no time left for other operations, he said.

Programmer Productivity Goal

This was when the company realized it needed a new system, a new approach to the problem. One of the basic goals outlined for the new system was to increase programmer productivity 10% to 20%.

Management wanted to increase the number of programs put into production per programmer and reduce the cost per line of code, Meradith explained.

Within the development staff, the goals included reducing the time lost by programmers waiting for keypunches and for

program test turnaround by providing better access to the computer resources.

Meradith's study also aimed at finding a system that would eliminate manual procedures for JCL and test job setup preparation by providing automated procedures and enforcement of their use.

Management also wanted to reduce the number of job failures through a precompile syntax-checking facility, to reduce print volumes and paper costs by utilizing CRT terminals for diagnostic output and to gain automatic monitoring and reporting of programmer activities.

In addition to the "mechanical" improvements that such a system should provide, Meradith also foresaw improved programmer morale as a result of hands-on operation.

As possible vehicles to reach that list of system goals, Meradith considered IBM's Time Sharing Option (TSO) and its Conversational Remote Job Entry (CRJE)

support. He also looked at Roscoe, a package from Applied Data Research (ADR) that competes with CRJE.

TSO was ruled out because it required an estimated 256K of memory and used 40% to 60% of available CPU time.

CRJE was also eliminated as a contender since it did not support the CRT devices Union Pacific wanted to use. In addition, it had neither a Cobol syntax checker nor a facility for conditional execution of command lists, Meradith said.

Roscoe, on the other hand, seemed to have everything the railroad wanted. It supports CRTs, for one thing, and has facilities that fall into six categories, all seeming to satisfy Meradith's goals.

Specifically Roscoe supports a data entry and editing facility and library storage including manipulation of data sets. Syntax checking as well as job submission and output retrieval capabilities are also included.

So is programmed prompting and job stream generation and a range of monitor services, Meradith found.

He and the other evaluators asked Roscoe users to estimate the effect of the package on their production.

25% Production Increase Expected

Based on those interviews, they expected "about a 25% increase" in productivity without increasing the programming staff, Meradith noted.

That was certainly about the 20% improvement Union Pacific had targeted for itself, and Meradith got the go-ahead to bring the package in-house.

In somewhat more than a year and a half of use, the railroad has chalked up some interesting statistics. Based on the number of lines of code and the cost per line, for example, production has increased by 30%, while the programming staff has decreased by 12.

The staff is doing 260 updates/compiles/link-edit per day, and that is more than twice the number done before Roscoe, Meradith said.

Pinpointing Problems Monitors' Only Role

(Continued from Page S/9)

most performance evaluation purposes, they are not particularly well suited for very detailed measurements, for example in real-time or on-line systems, Howard said.

Software monitors are "quite easy to use," and that is important for any type of monitor, he noted, to avoid possible distortions in the external user-controlled environment that would make the monitor results invalid.

"Probably the most important criteria" for selecting a monitor, according to Howard, are the reports it produces. Content of the reports is important, but so is format, he said; even if the data provided is accurate, it's not much help if it can't be read and understood easily.

The simplicity of use and relatively fixed range of reports available with most software monitors means that, except for the "usual problems" of report interpretation, there is little training required with this type of package, the report continued.

Although software monitors are physically more portable than most hardware monitors, contractual limitations imposed by the vendor may be a problem for a multiple-site user.

Because software monitors are "closely locked" to specific operating systems, the life span of any given monitor may be limited.

The five pages of tables included in the report provide rundowns on each of the 19 monitors covered.

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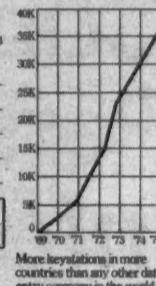
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CPE Not Everything

By Vincent J. Bannan
Special to Computerworld

When we look at the problem of the performance of the data center, too often we tend to become tangled in our own disciplines.

The first thoughts that come to mind when thinking of data center efficiency often concern the performance of either the operating system or the hardware.

Performance, however, has two basic components: the effectiveness and the efficiency with which we do our work. We can focus on the idea of efficiency by asking the question, "Is there a less costly way to achieve the same result?" Measures of effectiveness are addressed by the question "Is the result we get the result we desire?"

We may have the least costly hardware and software in our data center, but we may produce reports that are consistently late. The efficiency may be high, but the effectiveness measures are low and thus our performance is low.

At the technician's level, if we talk about performance, we talk about effectiveness and efficiency of hardware components. This is generally what we mean by computer performance evaluation (CPE) studies.

Bank 'Cashes In' on Utility Packages

(Continued from Page S/2)

check the internal labels on the physical devices to be sure the correct data set is available as input for a given run and to make sure the file space set aside for output is legitimately available.

Laxar said he had thought of building "something like Tfast" about two years ago, but "never got around to it."

"Then Oxford came along and its product included things I hadn't even dreamed of... but could certainly use." So he installed it, along with Dfast, which he had been actively studying when Oxford made the suggestion of Tfast as well.

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If we talk about performance from the shift supervisor's perspective, we might examine whether we could get along with fewer operators, whether the tape library should be manned 24 hours a day, whether we should investigate premounting or staging of our jobs, etc.

Effectiveness from the shift supervisor's perspective would focus on issues such as mounting the wrong output forms, scratching master files, misscheduling jobs, etc.

As the perspective of our performance measures move up higher in the organization, our focus widens to encompass everything from the receipt of input data to the proper shipment and distribution of the output.

Among the various components which comprise that sequence of work flow are many sensitive interrelationships with varying payoffs in efficiency and effectiveness.

It is well known, for example, that the sequence in the mix of jobs running in a multiprogramming computer can seriously affect the efficiency with which that computer operates.

But it's foolish to concentrate on improving the internal operation of the computer while ne-

glecting the fact that critical output - created by the improved job mix - languishes at the bursting and decollating workstation.

The payoff for the efficiency introduced in our computer processing is lost because there has been a breakdown in communication. The burster operator is unaware of the management priority or time value of the output he processes. To him, one job is just like another.

The same thing can happen in the keypunching area. The sequence with which one processes keypunching to prepare input for the day's jobs in no way affects the efficiency with which keypunching is done.

Role of Communications

But since this sequence can seriously affect the efficiency of the computer in a multiprogramming environment, one must examine the interrelated effects of one work center on the other. In this examination, communications plays a paramount role.

Till now, the computer professional has focused on performance improvement at a very technical and organizationally low level. His concentration has been centered on multiprogram-

ming mixes, keystroke rates, error rates, etc.

The time is fast approaching when we must begin to examine how the various work centers in a data center affect each other if we are to achieve the overall optimization of performance for the data center we seek.

We have to raise our sights and educate ourselves and first-level supervisors. It seems vitally important that in addition to knowing how to efficiently operate their particular function, they must be familiar with how the output of their function affects subsequent processing throughout the center.

It would be revealing for most data center managers to track each of their major applications with reference to time and to

examine how much time they spend in each of the work center functions within the center.

Some studies I have seen dramatically reveal that close to 75% of the time from input to distribution is not spent in the computer we tend to measure so precisely, but in some other function; i.e., data preparation, staging, bursting, decollating, etc.

I think we will begin to see a growing awareness on the part of upper management that these nonelectronic functions - which are under the control of the data center - must also be scrutinized if we are to improve our operations.

Bannan is president of Value Computing, Inc. in Cherry Hill, N.J.

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Tfast, Dfast and IBM's Power/VS spooling capability combine to make an impact on turnaround for unscheduled jobs like testing, he said. With that combination in place, "the system runs and we got a lot more productivity out of it."

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THURSDAY, JUNE 17

8:30 am—9:50 am: REGISTRATION. Pick up your seminar materials and get ready for two days of information-packed sessions.

9:50 am: WELCOME. Susan Alt, Editor, *Business Insurance*; Edward J. Bride, Vice President, Editorial Services, *Computer World*.

10:00 am: FACILITIES PLANNING: WHAT TOP MANAGEMENT NEEDS TO KNOW. You learn what steps you can take in the planning stages to minimize computer operations risks from Robert H. Courtney, Director of Data Security and Privacy, IBM Corp.

11:15 am: EMERGING RISKS—CLOUDS ON THE HORIZONS. Robert V. Jacobson, Assistant Vice President, Chemical Bank, reviews areas of increasing risk which threaten to become major management concerns, such as theft, sabotage, physical loss, and illegal access.

12:15 pm: LUNCHEON. Take this opportunity to get acquainted with your fellow registrants. Exchange ideas and information.

1:30 pm: RISK ROUNDTABLES. Three concurrent sessions—attend the one of your choice. The sessions repeat at 3:30 pm so you can attend a total of two.

EMPLOYEE DISHONESTY. William A. Mahoney, Vice President, Marsh & McLennan Inc., tells you how to handle a fidelity loss when the computer is involved.

AUDITING THE COMPUTER. How to make sure the computer program does ONLY what it is supposed to do . . . discussed by Joseph J. Wasserman, President, Computer Audit Systems Inc.

ERRORS & OMISSIONS RISKS. An examination of the many problems inherent in providing data processing services for customers, including quantifying the possible errors and omissions exposure, types of insurance available and user problems that have been experienced.

3:30 pm: RISK ROUNDTABLES. Repeat of above sessions. Attend the one of your choice.

5:30 pm: RECEPTION. Join your fellow registrants for cocktails and stimulating conversation.

6:15 pm: DINNER.

7:30 pm: NEGOTIATING THE COMPUTER CONTRACT. Roy N. Freed of the greater Boston law firm of Pollock, O'Connor & Jacobs tells you how a properly negotiated lease contract is one of the most effective means

of obtaining relief from a problem with a computer equipment supplier.

FRIDAY, JUNE 18

9:00 am: HOW TO PREPARE FOR BUSINESS INTERRUPTION. Paul W. Miles, Executive Vice President, I. Berman Co., discusses the risks involved in a computer stoppage interrupting your company's operations and how you can effectively plan for recovery.

David Warren, CPCU, Partner, Warren, McVeigh, Griffin & Huntington, tells you how to fund business interruption losses through insurance and self-insurance so you get the money you need to get back in business.

10:30 am: LOSS PREVENTION ROUNDTABLES. Two concurrent sessions. Each repeats at 1:30 pm so you can attend both.

RISK MANAGEMENT: DATA TRANSPORTATION & NETWORK COMMUNICATION. Rees S. Himes, Assistant Vice President, Marsh & McLennan Inc., identifies and discusses various kinds and causes of losses through transporting and telecommunicating data and tells of ways to minimize and control losses.

CASE STUDIES OF COMPUTER RIPOFFS. Donn B. Parker, Senior Information Processing Analyst, Information Systems Group, Stanford Research Institute, takes an in-depth, eye-opening look at two examples of the computer as a tool of the corporate criminal.

12:30 pm: LUNCHEON. No speaker, so take advantage of this opportunity to discuss areas of mutual interest with your fellow registrants.

1:30 pm: LOSS PREVENTION ROUNDTABLES. Repeat of 10:30 am sessions. Attend the one of your choice.

3:30 pm: HOW TO IMPLEMENT A GOOD RISK MANAGEMENT PROGRAM. Panel members William D. Hahn, Principal Consultant, George Betterley Consulting Group, Donald P. Fitzgerald, Manager of the Management Consultant Services Division of Ernst & Ernst, and a corporate client discuss the nuts and bolts of establishing an effective and workable risk management program for data processing exposures.

4:30 pm: ADJOURNMENT.

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Emphasizes User, DPer Teamwork**Booklet Used as Tool in Building Firm's DP System**

NIAGARA FALLS, N.Y. — The Carborundum Co.'s Systems Development Methodology (SDM) is a structured approach to building information systems.

Evidence of management's strong support for the approach lies in a booklet published by the company late last year for the benefit of user departments.

Designed to provide an overview of the process and to emphasize the teamwork between systems and user personnel, the booklet's introduction concludes with the note that "a mutual understanding of SDM will expedite the introduction and implementation of this process throughout the company."

The booklet's author led into the subject with analogies that most of its readers could accept. Developing and installing an information system, in this

view, "can be likened to designing and building a new Carborundum plant."

Both result from a new business opportunity or problem and involve "significant investments in time and resources." Similarly, each is to be completed within a finite time period, requires detailed analysis prior to the development of a firm plan and must be approached in phases, according to the booklet.

Building a plant and implementing an information system are similar, Carborundum continued, because both are development projects. They therefore incur similar risks:

- Developing the wrong end-product (not what was really needed).
- Spending too much (benefits become marginal).
- Taking too long (missing an opportunity).

Another similarity between systems building and other development projects is that, at the start of each, there are a significant number of unknowns.

The early phases of a systems project are more oriented toward quantifying these unknowns than they are toward generating tentative solutions, the booklet added.

The quantification of the unknowns early in the process reduces risk while management's investment in time and resource is still comparatively low. Other factors working in the same direction include having user management involvement throughout and high user participation during the development cycles.

Experienced project leadership, a stable user environment, a motivated user de-

partment and proven technology are also important in reducing the risks that surround any development work, the booklet said.

The problem faced by any developer is how to manage a project that initially is without a quantifiable goal, a known resource requirement, a reasonable estimate of elapsed time or sufficient information on which to base cost estimates, the author said.

Two-Level Planning

Beyond that, managers must plan the project at two levels — detail for the short term, broad for the remainder.

Design of a good system passes through a series of progressively more detailed iterations which implies a phased approach to the development effort. In early phases of the project, the main emphasis is on problem analysis rather than the development of a solution. The reverse is true as the project nears completion, Carborundum noted.

At the end of each phase, developers must make a decision: should they proceed with the next phase?

While the go/no-go decision is part of management "steering" of a project, there are other responsibilities as well, the booklet said. These involve reevaluating the objectives, scope and constraints of the project so that it can be aimed at a perhaps changing, but still desired, goal.

The two-level planning advocated by the booklet author is necessary for accurate time and cost estimating, scheduling and project control.

Phase planning includes identifying the phase start date, the target completion date and what activities are to be covered. It also defines who is responsible and then moves into an analysis of the specific activities, including resource commitments and start/completion dates.

The broad-range planning for the remainder of the project includes a list of the phases; list of tasks to be managed, in general; and an overall time schedule, the booklet added.

Goal of SDM

Applying this list of project management tools and techniques to the data processing area in particular, the booklet said the goal of SDM is to provide Carborundum's management information systems (MIS) group with the vehicle to deliver systems in line with the user's business objectives.

SDM consists of a project structure made up of phases, tasks and activities. Each phase is divided into tasks, each task into activities. Systems projects can range from minor modifications to major development and implementation efforts, the booklet noted.

SDM therefore has to be "tuned" to the requirements of a particular project by selecting, deleting, adding or rearranging appropriate phases, tasks and activities. Tuning is affected by the problem statement, the project itself and current views of the solution options, Carborundum said.

Cooperation among the functional areas involved in developing a system is essential, the booklet noted before providing a matrix of responsibilities falling to user management, project management, project team, systems designers, programmer and computer operations.

Finally the booklet explained that Carborundum is utilizing Modular Application Systems (MAS), a prewritten set of application programs developed specifically for use in manufacturing companies.

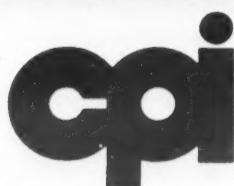
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Parallels Mark Advances of Science, DP Measurement

By Donald C. Harder

Special to Computerworld

Remarkable parallels can be drawn between the general development of science and the art of computer performance measurement. In many respects, we are just coming out of the medieval period in computer measurement where the lines between philosophy, alchemy, true science and downright obstructionism are just beginning to be known.

As with science in general, progress will be a slow and uneven process until more people are active in the field. Most pioneers of science were individuals acting alone. The fruits of their efforts grew into the team approach, yielding much more predictable results — as in the case of the atomic bomb.

These pioneers present us with a fascinating parade of skills, talent, luck and dedication. Most of these early people realized their discoveries with the crudest of instrumentation and measurement techniques. Their examples leave one wondering, "Why couldn't I have done that?"

Breakthroughs in Chemistry

Antoine Lavoisier, for example, was active in the field of chemistry during the late 1700s. He was originally directed to the study of law, but his enthusiasm for science asserted itself.

Science, at these times, was still laboring under some of the latter medieval controls of knowledge by the church and the state. Alchemy was still on the scene. The most notable example was the "Phlogiston Theory," which stated that phlogiston was a substance which escaped from the bodies as they burned.

Lavoisier had a genius for systematic organization. He also had a passion for scrupulous exactness in measurements, and this was the key to many of his experiments. He was always busy with balances, weighing chemical elements and compounds exactly before and after reactions.

Building upon the current work being done with heat, he determined the properties of oxygen and its role in combustion. This basic work overthrew the false doctrine of phlogiston.

Discarded Theories

The world of science has known many occasions where theories have been proven false. Our knowledge of computer measurement is not as clear as Lavoisier's chemical experiments, but we can certainly identify the discarding of the notion (or theory) that 100% CPU utilization automatically represents good data processing management.

Lavoisier's "Elementary Treatise on Chemistry (1789)" represented the first great synthesis of chemical principles, and he was then well on his way to earning the title of being the "father of science."

It was quite fitting that he should have been a member of the commission appointed in 1790 to establish a uniform system — the metric system — of weights and measures.

The introduction of a system of metrics is certainly the major next frontier in the field of computer measurement.

Another man involved in the definition of work and the introduction of a system of metric was Frederick Taylor.

About 100 years after Lavoisier's work, Taylor was serving his apprenticeship in the machine shop at Midvale Steel in Philadelphia. Weakened eyesight had caused him to drop out of Harvard.

He became familiar with the work practices and conflicts of the day, which was a period of great economic growth and immigration to the U.S.

For three years, as shop foreman, he attempted to speed up production, but success was marginal and marred with hard feelings in his former coworkers. He then started intensive studies into the

nature and patterns of work, armed with a stopwatch and a pad of paper.

During the next 26 years he directed performance of between 30,000 and 50,000 documented experiments into the nature of cutting metals. These studies dealt with some 12 variables, including the shape of the tool, depth of cut, feed speeds, belting, coolant and so forth.

The result was a paper, "On the Art of Cutting Metals (1907)" presented to the American Society of Mechanical Engineers, that was proclaimed worldwide as being the ultimate answer on the subject. The stopwatch work led to the formal time and motion study that forms an important part of the practice of industrial engineering of today.

Underlying Objectives

His underlying objectives of scientific management were "that true industrial harmony lay in the cooperation of work-

ers and employers to increase productivity and wages, and that this end could be achieved by the scientific methods of management."

Thus his system was directed to the following ends: standardization of work, which meant the determination of the "one best way" of working; and controlling so extensively and intensively as to provide for the maintenance of all these standards.

To increase productivity, he said, management had to break the work process into the smallest possible components; fit jobs into structures that clearly emphasize the duties and boundaries of each job rather than its part in the total process; wherever possible, use individual or small-group monetary incentive systems, gearing pay to the output; subtract skill and responsibility from the job to make them functions of management.

The nature of the work of the data

center is just beginning to be examined in some quantitative form. From Taylor and Lavoisier we see how simple "instrumentation" can be used effectively.

However, it will still depend upon each data center to work out for itself these important definitions of computer work because most centers are isolated service utilities.

The rewards for these definitions can range from improved program code resulting in better service to customers, shorter job elapsed times and lowered use of computer resources.

Results may be shown in more accurate forecasting of future demands, with attendant savings for large sums of money. Or, as a consequence, the DP professional may simply find his data center is a more enjoyable and harmonious place to work.

Harder is president of CRU, a Cleveland-based vendor of a hardware monitor.

The '76 NCC Landmarks June 7-10

This is the year of landmarks at the National Computer Conference, June 7-10 in New York. The '76 NCC . . . during our Nation's Bicentennial . . . will explore the latest trends in computer science and technology, systems and applications, societal concerns, EDP management, and professional issues. And that's only the beginning. Other landmarks include the largest exhibit program ever held at an NCC, plus the 25th anniversaries of both the first Joint Computer Conference and the first commercially available electronic digital computer.

Register now for the world's most comprehensive computer conference. More than 100 information-packed sessions will cover 12 major areas including complex systems, architecture and hardware, software, computer communications and networking, applications, and education. And more than 275 organizations will display their latest computer products and services on three floors of the New York Coliseum.

Heading five plenary sessions will be a keynote address by J. Paul Lyet, Chairman and Chief Executive Officer of Sperry Rand Corporation. In addition, the NCC will feature a variety of special events and activities, including a unique networking demonstration and a Pioneer Day Program pay-

ing tribute to individuals from the Moore School of Electrical Engineering. And for an added fee, program registrants may also choose among a number of Professional Development Seminars.

Apply now for the NCC Bicentennial Card covering all four days of the conference, including exhibits. You'll save \$15 on full-conference registration. Just fill in the coupon for advance registration, or to get all the facts on the '76 NCC.

**'76 NCC, c/o AFIPS, 210 Summit Avenue,
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CWLD

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Please send me all the facts on '76 NCC.

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**'76 NCC
Landmarks
in Data Processing**



Now you can make your software more reliable and less expensive in two hard days on Software Engineering.

The goal of this seminar on **How to Increase Programming Productivity Through Software Engineering** is simple: more cost effective and reliable software through improved analysis, design and implementation methods. We call it "Software Engineering", and it's a topic that has become more and more important as software costs escalate. Right now, for example, it is not unusual for the cumulative cost of software development, maintenance and enhancement to match or even exceed the total investment in hardware over the course of a system's life.

How to Increase Programming Productivity Through Software Engineering will give you the information you need to evaluate the new Software Engineering methods receiving widespread attention as they apply to your organization. This includes Structured Programming, Structured Analysis (TM), top-down design, implementation and testing, and new approaches to managing the development process. The seminar will also enable you to evaluate the effect these new methods will have on your operation and management style.

Attention will be focused on the high leverage areas, especially methods for improving the analysis and design process. A recent Department of Defense survey showed that 64% of software errors tend to be hidden ones, and do not surface until late in the development cycle. Over half the total errors remained hidden until acceptance testing or later. Of these hidden errors, 83% were in analysis and design. These statistics emphasize that Structured Programming alone is no substitute for the structured approach to the entire development process to be stressed in this seminar.

Who Should Attend

The course is designed for managers. It does not get involved in the technical detail you will find in the large number of courses designed for programmers on new methods. When you have completed both days of intensive instruction and question and answer sessions, you'll have what you need to start using the methods and tools which can significantly improve the reliability and cost effectiveness of your software while increasing user satisfaction. Especially important — you'll know how to avoid the pitfalls that have trapped the innovative but unwary manager.

John W. Brackett, PhD and Prof. Clement L. McGowan are the Seminar Leaders

John W. Brackett, PhD is a founder of SofTech and is a company Vice President responsible for the development and application of improved analysis and design methods. Dr. Brackett has been a consultant to several major computer manufacturers on new program development techniques for improving programming productivity. He has presented this seminar to many large industrial and government organizations, including ITT, MITRE, United Technology, the U.S. Navy and U.S. Air Force. Together with Dr. McGowan, he developed a new graduate-level course in Software Engineering at Brown University.

Clement L. McGowan, PhD is a consultant to SofTech, and is an Assistant Professor of Applied Mathematics at Brown University. Dr. McGowan co-authored the recently published book, *Top-Down Structured Programming Techniques*. He has been a consultant to the IBM Federal Systems Division responsible for the development of many of

the new methods currently receiving widespread attention. He is an associate editor of the *Journal of Computer Languages* and is a member of the IEEE Computer Society, ACM and Sigma Xi.

Charges and Enrollment

The charge for the entire 2-day seminar, including continental breakfasts, luncheons and all course materials is \$300. Additional registrants from the same company are charged only \$250. This does not include hotel rooms, if necessary, but we have reserved space at seminar hotels for attendees who wish them.

To enroll, look over the schedule below, fill in the coupon and send it in. Remember, enrollment is limited and no space can be firmly held until we have received check or purchase order.

How to Increase Programming Productivity Through Software Engineering is presented by The EDP Seminar Series in association with SofTech, Inc.

To: Ed Bride
Vice President, Editorial Services
Computerworld
797 Washington Street
Newton, MA 02160



Please enroll me in the **How to Increase Programming Productivity** seminar for the city and date checked:

<input type="checkbox"/> Wash. D.C.	Stouffer's National Center Inn	April 26-27
<input type="checkbox"/> Atlanta	Hyatt Regency	May 3-4
<input type="checkbox"/> St. Louis	Marriott at Lambert Airport	May 24-25

Please send me more information on the **How to Increase Programming Productivity** seminar.

Name _____

Title _____

Company _____

Address _____

City _____ State _____ Zip _____

Phone (_____) _____

Note: If time is short, you should call us collect. Call Miriam Ober at (617) 965-5800.

How to make sure your contracts work for you instead of against you.

In just two and a half days, "**Legal Tools for Computer Contracting and Protection**" will give you what you need to know to protect your equipment, your systems and your organization.

When the lawyers for one of your suppliers sit down to draft a contract for you to sign, you can bet they don't have your best interests in mind. But you don't have to be defenseless. Given a basic knowledge of the unique problems of contracting in the computer industry, you can make sure your contracts are working to get you what you're paying for — not protecting the other guy from his mistakes. And that's just what this seminar can do for you. We will even review your current contracts — right in class.

The Course Work

Roy Freed, the seminar leader, will review all types of contracts impacting computer use, including:

- the lease or purchase of systems — bundled or unbundled
- the purchase of time-sharing, data processing services and consultation
- the use of facilities management
- and others

In addition to a basic review of the laws regulating DP contracting and taxation, you'll learn how to apply the legal rules in a positive way to gain advantage for yourself. And bring your own contracts, because they will be an important part of the course work. All registrants are invited to bring their contract forms to the seminar for discussion and review to the extent feasible.

In the workshops you'll gain practical experience with the techniques under study. You'll learn, for example, how to recognize opportunities to negotiate; how to establish performance goals and conditions while you can still do something about it; how to avoid costly litigation and resolve disputes; and how to achieve significant tax savings through the proper structuring and wording of contracts. Plus, you'll gain valuable experience with techniques for handling any transaction. Overall, you'll have an excellent chance to learn a great deal in a short time, as many of our earlier participants have found:

"This seminar will provide me with an ability to evaluate future contracts and renewal contracts for refinement purposes. This course has been excellent."

F. Ford, Entrex, Burlington, Mass.

"I considered this to be a very good fundamental review of basic problems associated with EDP contracting."

J. M. Aubry, Canadian Government

"This was an exceptionally well organized seminar. The material presented was significant and useful. This seminar would be of great practical value to someone without computer contracting experience as well as serving as a useful outlet and review for those with more background and experience."

William C. Prinn, Director, Advanced Planning
Chessie System, Baltimore, Md.

"I had no idea that we would have the opportunity to communicate so closely on an informal basis. That, combined with your excellent preparation, made this experience the most rewarding seminar experience I've had. I commend you for what I regard as a most worthwhile seminar, and thank you for your genuine interest in communicating with, and not merely to the participants."

SV, Attorney, Worcester, Mass.

"The appropriateness of this seminar is extremely important. This area of the Computer Science field has generally received little or no attention from user, vendor or the legal professions."

D. J. Connelly, Development & Control Manager
Norton Company, Worcester, Mass.

Roy N. Freed is the Seminar Leader

Roy N. Freed is internationally known for his acuity and expertise in this field, and he will personally direct the entire seminar. A graduate of Yale Law School, Roy has served as inside counsel for a major manufacturer of digital computers, and is currently engaged in private corporate practice in greater Boston with the firm of Pollock, O'Connor and Jacobs. He teaches at Boston University Law School, and has written many articles on this subject, including "Computer Fraud, a Management Trap" (Business Horizons), and "Get The Computer System You Want" (Harvard Business Review). He is the author of the book, *Computers and Law — a Reference Work*, now in its fourth edition, and he also edited the complete, extensive course materials used in this seminar.

Charges and Enrollment

The charge for the entire 2½ day seminar, including continental breakfasts, luncheons, and all course materials is \$325 per registrant. Additional registrants from the same company are charged only \$275. This does not include hotel rooms, if necessary, but we have reserved space at the seminar hotels for attendees who wish them.

To enroll, look over the schedule below, fill in the coupon and send it in. Remember, enrollment is limited and no space can be firmly held until we have received check or purchase order.

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Please enroll me in the **Legal Tools for Computer Contracting and Protection** seminar for the city and date checked:

<input type="checkbox"/> Seattle	Airport Hilton	May 5-7
<input type="checkbox"/> Chicago	Hyatt Regency O'Hare	June 16-18
<input type="checkbox"/> New York	Summit Hotel	June 23-25

Please send me more information on the **Legal Tools for Computer Contracting and Protection** seminar.

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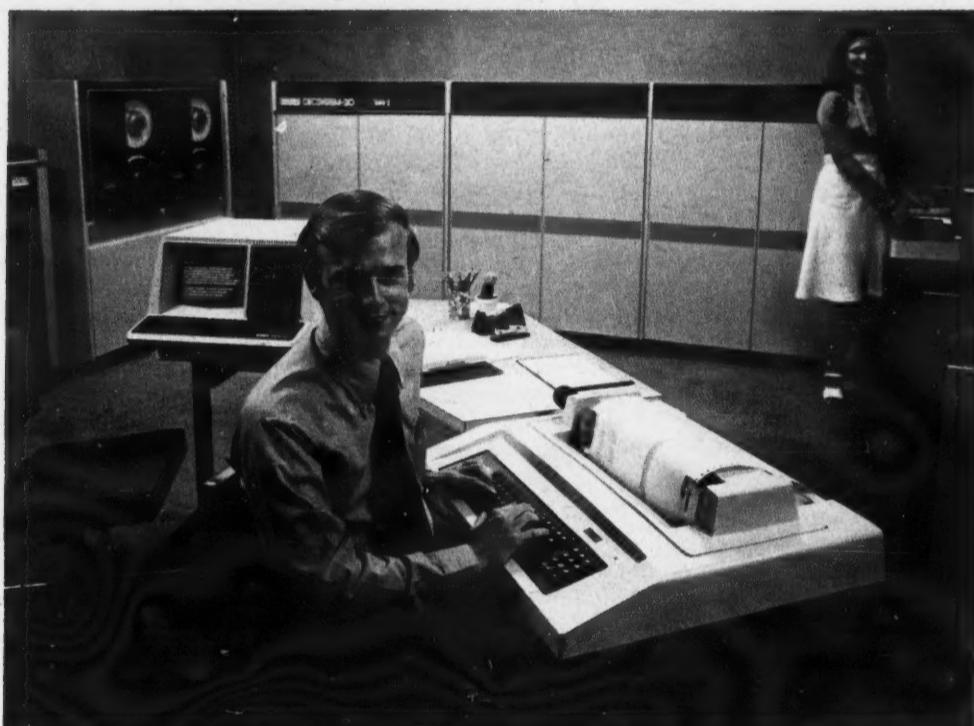
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The best of the big systems:

Powerful, reliable multi-stream batch.

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Ease of operation.

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Ease of installation.

Small physical size.

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Allows Data Entry Backup

Linking Systems Keeps Department's Data Moving

Special to Computerworld

WILMINGTON, Del. — By tying three data entry systems together, the Fabrics and Finishes Department of The DuPont Co. here has been able to keep data moving even when part of the system is down.

By choosing three processors each with eight keystations, instead of one processor for the entire 24 keystations, the department has been able to schedule preventive maintenance during normal working hours and still keep the entire staff working.

Fabrics and Finishes (F&F) supplies protective and decorative coatings for industrial, marine, transportation and consumer purposes.

According to Dan O'Connor, DP supervisor, his section evaluated the top five key-to-disk vendors before settling on the Mohawk Data Sciences (MDS) 1200 systems.

"Before introducing the MDS systems, we had an enormous

Tape Drive Runs At 6,250 Bit/in. In Small Chassis

SANTA MONICA, Calif. — A 6,250 bit/in. tape transport in a 19-in. by 24.5-in. chassis has been introduced here by Gulliver Technology Corp. The unit is the first of the 6,250 bit/in. drives in such a small chassis, the vendor claimed.

Tape speeds on the unit range from 45 in./sec to 125 in./sec with data transfer rates from 36 kbyte/sec to 781 kbyte/sec, according to the firm, which noted that both long-gap (.6 in.) and short-gap (.3 in.) operations can be accomplished with no program changes.

The firm claimed the performance of the unit compares with that found in IBM and Storage Technology Corp. long-column machines through a series of proprietary changes in tape path, reel servo and capstan control design.

The unit is priced at under \$10,000 and offers dual-density 6,250/1,600 bit/in. or 1,600/800 bit/in., according to the firm.

Autoload is a standard feature, and options include dual-speed, dual-port access and IBM 3420 interfaces, the firm added.

All units are field-upgradeable to any speed or feature combination, the firm added from 1728 21st St., Santa Monica, Calif. 90404.

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keypunch operation," O'Connor said.

"In fact, we still keypunch certain applications. But an excessive amount of time was being wasted on handling source documents and cards. With a load of about a million cards a month, operators were spending a lot of time taking batches of cards, bound in rubber bands, to verifying stations for final checking. "Obviously, we wanted to keep

data, not the operators, moving," O'Connor added. "The conversion from cards to key-to-disk has turned in-transit time into productivity."

50% Redundancy

F&F's present requirements indicated a need for 24 keystations to handle its invoicing, accounting and stock control applications. A single MDS 2400 processor could have handled

the workload of 24 operators.

As with any shared-processor system, however, there is always the possibility that keying will be interrupted if the processor becomes inoperative because of component failure or maintenance, so backup became a primary consideration.

"Three MDS 1200 systems are linked to provide 50% redundancy," O'Connor explained. "Each processor controls eight

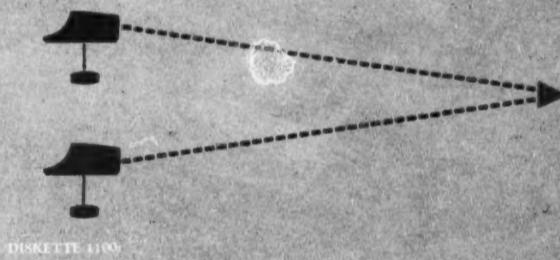
keystations. During maintenance, the entire group of operators can be divided between the other two processors for continued operation.

"The ability to swap individual or chained keystations from one system to another not only provides backup, but affords greater flexibility in configuring the installation. Keystations can be alternated between processors as the workload requires."

Datapoint Dispersed For the Company that's

Diskette 1100: Intelligent data entry, local data storage, local processing and communications — these are the four basic requirements for dispersed data processing. The Diskette 1100 meets these needs with a unit combining a powerful general purpose computer, keyboard and video display plus up to four diskette drives yielding over a million characters of storage. Communications can operate with auto-answer and auto-dial in a variety of disciplines. With the Diskette 1100 field data can be entered and pre-processed locally before transmission to the home office computer. Input errors are minimized, home office computer efficiency maximized with this approach.

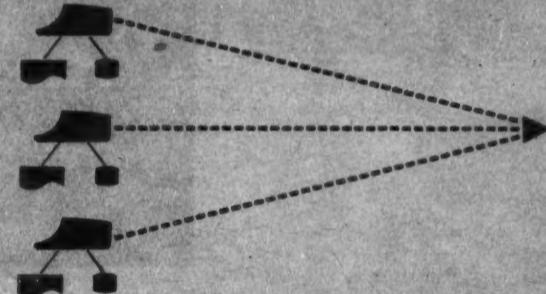
Dotted line indicates dial-up connection to home office computer



DISKETTE 1100

Datapoint 2200 with Cartridge Disks: As field office workload increases so does the requirement for more storage. The Datapoint 2200 with two cartridge disks offers over 5 million characters of on-line storage plus expansion capability to up to 4 disks to handle future growth. DATABUS programs written for the Diskette 1100 are fully compatible with the 2200 with Cartridge Disk so there's no need to start from scratch. Your initial programming investment still keeps earning money on the upgrade.

There's also a wide variety of peripherals to meet printing and other storage needs such as magnetic tape. Or you may continue with the peripherals used with the Diskette 1100.



DATAPPOINT 2200 WITH CARTRIDGE DISKS

Datapoint Dispersed Processing Systems — An Economic Breakthrough:

For the most efficient dispersed data processing, you need a true computer capability. You also need systems that can grow with you without the requirement for reprogramming. That's what you get from Datapoint's dispersed processing product line, the most complete in the industry and accompanied by a full roster of proven operating systems and programming languages. For the company that's in a growth phase in various locations, these systems constitute the optimum approach to providing the processor power needed in local offices, where it can be put to use most efficiently, while still allowing the economic advantages of

centralized computer power. With program compatibility between Datapoint systems (and through emulation packages with any mainframe) it's the ideal way for growth companies to enjoy the advantages of a highly sophisticated yet highly practical automation at prices that constitute true economic breakthroughs for the industry.

For more information, contact the sales office nearest you or write or call Datapoint Corporation, Attn: Marketing Department, San Antonio, Texas 78284, (512) 690-7151.

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Punches Collect Variable Data on Steel Mill Floor

Special to Computerworld

CHICAGO — Collecting variable production and inventory control data and feeding it into an automated production system can be a challenging job, especially when that data collection involves some 30 remote job sites in a large cold roll steel mill.

At the Indiana Harbor Works of Inland Steel Co. here, however, an answer has been designed that keeps the information flowing at all times on all variables involved in the production and inventory control of

the approximately 150,000 tons of steel that are in process at any one time.

Basic System

The basic information system for collecting and feeding back data throughout the 200-acre mill is an IBM 1030 network, with terminals set up at 30 job sites. All production is monitored and reported through this network, and at the control computer adjustments are made to inventory figures to reflect production.

In addition to nonvariable information, the production process entails the reporting of variable data, such as changes in the mix process or in line speeds.

This information must be tracked throughout the plant and fed into the system at the various job sites.

Card Punch Used

This variable information is entered at each of the job sites on a Wright Line Model 2600 card punch.

As information on changes in

the mix process or line speeds is read, it is encoded by the job site attendant on an 80-column card. The attendant inserts the card, which has been pre-coded by the DP center, and punches the information in the appropriate column.

The card is held in place by an adjustable card locator and can be moved to any column by engaging the carriage release. Multiple punching in one column is accomplished by either holding down the space key to suspend all spacing and depressing

the required keys or by depressing any number of keys simultaneously.

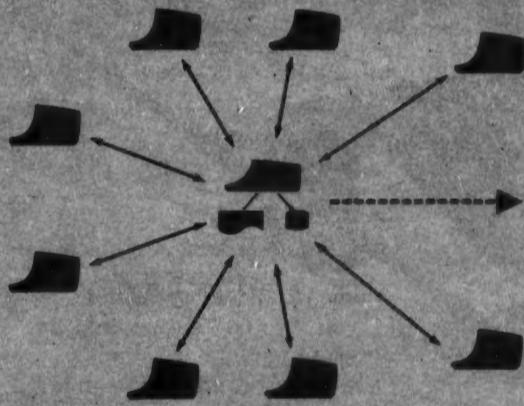
"The problem was finding a practical way of capturing variable information at each of the 30 tracking sites," according to Ed Richards, supervisor of inventory and control systems at Indiana Harbor Works. "And, by practical, I mean usable within the plant environment and producing an input document acceptable to the computer system."

The punch is held in place at the job site by nylon clasps. However, should the configuration of job sites change, it can be moved to another site. A wood carrying case adds to its portability, Richards said.

Processing Systems— Growing All Over the Place

8-User DATASHARE System: Now the workload is really getting large. Local office personnel are heavily involved with the creation and maintenance of their own files. They're handling a lot of the processing and utility chores that formerly required high-cost time on the home office mainframe to accomplish.

The 2200-based DATASHARE system will accommodate up to 8 users simultaneously, each running separate programs and accessing either private or master files. With this system, many phases of field office processing can be done concurrently: for example, users at some terminals can enter data to system files while others are running programs to generate reports or keep track of inventory. DATABUS programs written for earlier systems



8-USER DATASHARE SYSTEM

will also run here, saving development cost and time. Most importantly, field office personnel have instant access to local business data — there's no need to wait for the needed information from a home office file.

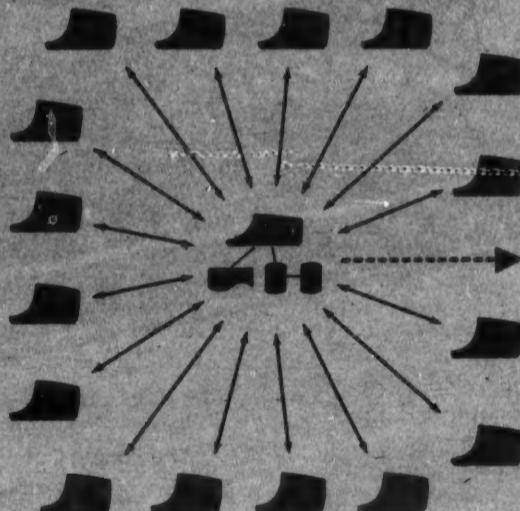
At the end of the day or between shifts, the local DATASHARE system can communicate with the home office computer and exchange field data, allowing home office and field personnel to work always with current, edited information, while data entry errors and transportation bottlenecks become a thing of the past.

16-User DATASHARE with Concurrent Communications:

The ultimate in dispersed data processing: A DATASHARE system using the Datapoint 5500 Advanced Business Processor providing up to 16 work stations and 200 million characters of on-line storage at the lowest cost-per-terminal in the industry.

The computing power of the 5500 provides more work capacity plus the ability to communicate with the home office while user terminals are operational. Files may be exchanged and system utilities and debugging routines run while DATASHARE use proceeds without interruption.

With its powerful computing capability the 5500 DATASHARE can handle all of the data processing



16-USER DATASHARE WITH CONCURRENT COMMUNICATIONS

requirements of a regional or manufacturing facility independently or work in conjunction with the home office computer, depending on what's most economical for the user.

Datapoint dispersed processing systems are designed for growth. We offer a variety of configurations, from small to large scale, which can be installed in scattered facilities of a company, depending on current work requirements. Not only can users pick and choose the precise configurations called for by current work loads in their various offices but they enjoy both modularity and upward program capability — that is, systems can be readily expanded to handle increased work loads while employing the programs created for initial configurations.

DATAPPOINT CORPORATION

The leader in dispersed data processing™

Unit Performs Tape Conversion For University

GLASGOW, Scotland — A system that allows direct conversion from almost any 7- or 9-track media to any other digital format is now operating at the Regional Computing Organization of the University of Glasgow here.

The system was designed by Computer Instrumentation Ltd. (CIL) England using five Pertec Corp. T8000 magnetic tape transports and a dual Pertec D3000 disk drive unit.

Controller for the conversion unit is a 16K System 90 mini-computer developed and marketed by CIL, Pertec's distributor in the UK.

The equipment converts data on 7- or 9-track magnetic-tape or cassette-tape format or on punched paper tape.

Communications Network

The unit communicates directly with Glasgow University's data communications network using Hasp multileaving communications protocols. Computer facilities in the network include those at the Universities of Edinburgh, Glasgow and Strathclyde and several Research Council Institutes in Scotland.

Special features of the system include handling of substandard tapes, reading or inserting non-standard single-character file marks on 7-track tapes and handling very short interrecord gaps on incoming tapes. Error-detection and location operations are also provided.

In addition to the mini-computer, tape and disk drives, the conversion system incorporates a cassette drive and paper-tape reader in a single five-bay cabinet.



FROM THE WORLD LEADER IN TTY-COMPATIBLE VIDEO TERMINALS...A NEW CONCEPT IN COMPUTER TERMINALS FOR THE OEM MARKET



Now, through plug-in modularity, systems manufacturers can configure terminals to meet specific user requirements while maintaining complete spare parts compatibility. A full range of options to choose from, at prices reflecting the advantages of microprocessor technology.

Standard Features

- 1,920 character display (80x24).
- 12-inch bonded screen.
- Incremental and absolute cursor positioning.
- Dual video intensity.
- 10-key numeric pad.
- Movable keyboard.
- Choice of 8 transmission rates up to 9600 baud.
- Communication interfaces switchable between EIA RS-232 and current loop.
- Choice of block or blinking underscore cursor.
- Choice of white-on-black or black-on-white display representation.

The Editing Option

- Field attribute designation, which allows the host computer to assign one or more of the following conditions to specific screen locations:
 - Blink or no blink.
 - Standard or reverse video.
 - Low- or high-intensity representation.

- Protected or unprotected data from operator input.
- Alpha, numeric or alphanumeric entry only.
- Display or non-display of data.
- 8 different video representations.
- 8 Special function keys.
- Data compression and record separation.
- Tabulation advance, back, set, clear and automatic.
- Automatic repeat function for period, space and dash.
- Insert and delete line.
- Insert and delete character.

The Polling Option

Provides protocol compatibility for interfacing to communications networks. Protocol may be user-defined.

Other Options

- Upper/Lower Case
- Parallel Output Connector
- Serial Output Connector
- 202C Compatibility
- Synchronous Interface
- Modem Cable
- Mechanical Security Lock.

Human Engineering Features

- Clear, Sharp 7 x 9 dot matrix display.
- Elevated bonded screen for comfortable viewing.
- Stair-stepped keyboard for rapid, error-free data entry.
- Non-glare key caps for operator comfort.
- Moveable keyboard with disappearing cable.
- Modern design complements any office.

Now, with Modular One, Hazeltine makes it easier than ever for system manufacturers to have precisely the right terminal at the right price! Phone your nearest Hazeltine representative today for a demonstration and price quotation.

Modular One establishes new standards of reliability and value for computer terminals, incorporating the latest in high-reliability design techniques and components...the kind you expect in any product bearing the Hazeltine name, the Company with more than a half-century of leadership in electronics and displays.

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Mini Bits

GML Guide Offers Details On Mini, Micro Offerings

LEXINGTON, Mass. — The 1976 version of the *Minicomputer Review* from GML Information Services is a pocket-sized looseleaf book that contains individual company profiles of mini, micro and turnkey vendors, a page for each manufacturer's offerings and, in chart form, an outline of the applications and price of each model.

Information furnished for each machine includes application; CPU and I/O specifications; software specifications; peripherals available; and special features.

The book costs \$48. Updates are issued in May and September from the firm at 594 Marrett Road, Lexington, Mass. 02173.

VRC Drum Memory Fits PDP-11

NORTH SPRINGFIELD, Vt. — Vermont Research Corp. (VRC) has an OEM random-access head-per-track memory system that interfaces to Digital Equipment Corp. PDP-11 minis.

The Model 4401 drum memory system is functionally equivalent to the DEC RC11/RS 64 memory, VRC said. Memory capacities up to 2M 16-bit words can be accommodated.

Average access time is 8.5 msec, VRC said.

With 1M-word capacity, the system sells for \$10,900 VRC said from Precision Park North, Springfield, Vt. 05150.

Emulator Links Status Units

PALO ALTO, Calif. — With the Line Printer Emulator interface from Varian, users of the Data Products 2000 series of Centronics line printers can add Varian Status printer/plotters to their system without a controller change, the firm said.

No additional software is required, and the Emulator will operate under existing line printer programs, the firm said.

The unit costs \$250 from the firm at 611 Hansen Way, Palo Alto, Calif. 94303.

Half-Card Memories Available

IRVINE, Calif. — Computer Automation, Inc. has 1K and 4K 16-bit word memories packaged on a half card, the same size used for semiconductor memories.

Ordering a 1K core card with a Naked Milli LSI-3/05 CPU card provides OEMs with a Model 10320-01 minicomputer, priced at \$723 in lots of 100; the same CPU with a 4K core memory, called Model 10320-04, sells for \$965 in the same lot size, the firm said from 18651 Von Karman, Irvine, Calif. 92664.

By Esther Surden
Of the CW Staff

NEW ORLEANS, La. — Minicomputers once used in the nose cones of Minuteman missiles will soon be providing health data to set standards for medical priorities and procedures.

The Minuteman D17B systems will be aboard a trailer caravan traveling throughout the U.S. giving instant information with results going to the patient's own doctor.

The results will also be sent to an IBM 360/50 system in North Carolina that compiles statistics for the National Center for Health Statistics of the Public Health Service, according to Dr. Charles H. Beck, professor of electrical engineering at Tulane University.

Beck heads Tulane's Health Reachout Using Systems Techniques (Thrust) effort here.

The minis used in this project are five of over 1,000 manufactured by the Autonetics Division of North American Rockwell in the 1960s, Beck said. The minicomputers originally cost the taxpayer \$250,000 each; they have since been phased out and replaced by the Multiple Independent Reentry Vehicle missiles using Minuteman 3 computers, Beck said.

The systems were programmed for the project by Beck and his group in machine language after many unsuccessful attempts to create a compiler that would not take up too much main memory.

Selecting a Mini — Part 3

OS Critical Software Element

By Robert E. Berkman
Special to Computerworld

System software consists of the operating system, compilers and utilities that are provided with the hardware and are resources to be used by the programmers to make the system function effectively.

If the operating system software is not working, the system cannot function. In addition, system software errors are generally hard to find and correct.

The operating system is the most volatile piece of system software.

An operating system cannot be fully debugged and work perfectly for the first installation because all the possible combinations of users cannot be tested in a small amount of time.

For this reason, great care should be taken in selecting any newly released operating system. Like new hardware, the operating system should reach a level of stability through use over an extended period of time and in a number of installations.

Most companies that are planning to

install a business computer system are not interested in developing the system in-house and rely on the selected vendor to provide the programming. Even so, the programming language used is of great importance.

Some languages are very effective and

This article is the third in a series on the selection and evaluation of business minicomputer systems. This article covers the software considerations.

efficient from a processing standpoint. Others can be easily learned by nontechnically-oriented people.

Basic is a programming language that is not very efficient in a processing sense, but it can be learned in a short period of time. When your system is installed and working, you can fairly easily write new programs to provide additional capabilities.

However, making modifications to systems, especially integrated systems, can be very complex and should be left to

(Continued on Page 47)

the test results before the patient gets up off the examination room table.

The system can reconstruct an EKG wave or other test after it is recorded. The operator can recall it and have the wave displayed.

Under program control, the 9-track tape unit associated with the system will back up and search for the specific part the operator needs. Via the digital-to-analog converter, the system reconstructs the wave form on the usual strip chart for confirmation, Beck said.

Patients are identified by number, height, weight, sex and health characteris-

(Continued on Page 45)

Adam Family of Minis Enhanced With Addition of Custom Micro

BURLINGAME, Calif. — Logical Machine Corp. (LMC) has enhanced its Adam small business system to include a custom-designed microprocessor unit.

The microprocessor includes a single microprogram that directly controls all peripherals without the use of interface modules, a spokesman said.

The enhancements have been made at no increase of price to the user, he added. Users with Adam models incorporating the firm's former central processing unit

can upgrade to the new model for about \$2,500, the company said.

The enhancements are said to give the system greater reliability and allow future upgrades to take place with greater simplicity.

The microprocessor unit is based on Intel's 3000 bipolar microprocessor chip and is contained on two circuit boards. A memory controller and 32K bytes of MOS memory occupy an additional two circuit boards, according to the firm. Peripheral devices attach directly to the card cage, the company said.

The Adam processor has 30 registers and features a 200-nsec instruction time, automatic detection and recovery from power failure and a data transfer rate of 1.25M byte/sec, LMC said.

Mounted Under Disk Drive

The processor is mounted directly under the disk drive, while the space formerly used for the processor and interfaces for the various peripherals is now used for storage, a spokesman said.

Memory is Intel's IN-42, with eight 4K increments of random access memory fixed on the board. Memory cycle time is 550 nsec.

The system uses English as its language. It "learns" the meaning of new words in terms of previously learned words and can be "taught" the difference between verbs, nouns and structures via the keyboard, the firm said.

The system includes a 165 char./sec, 65- to 200 line/min, 7 by 9 dot matrix printer; an integrated data entry/display terminal operating at 4,800 bit/sec; and 10.6M bytes of disk with an average access time of 35 msec.

The Adam system costs \$39,995 with a maintenance charge of \$199/mo after delivery from the firm at 887-A Mitten Road, Burlingame, Calif. 94010.



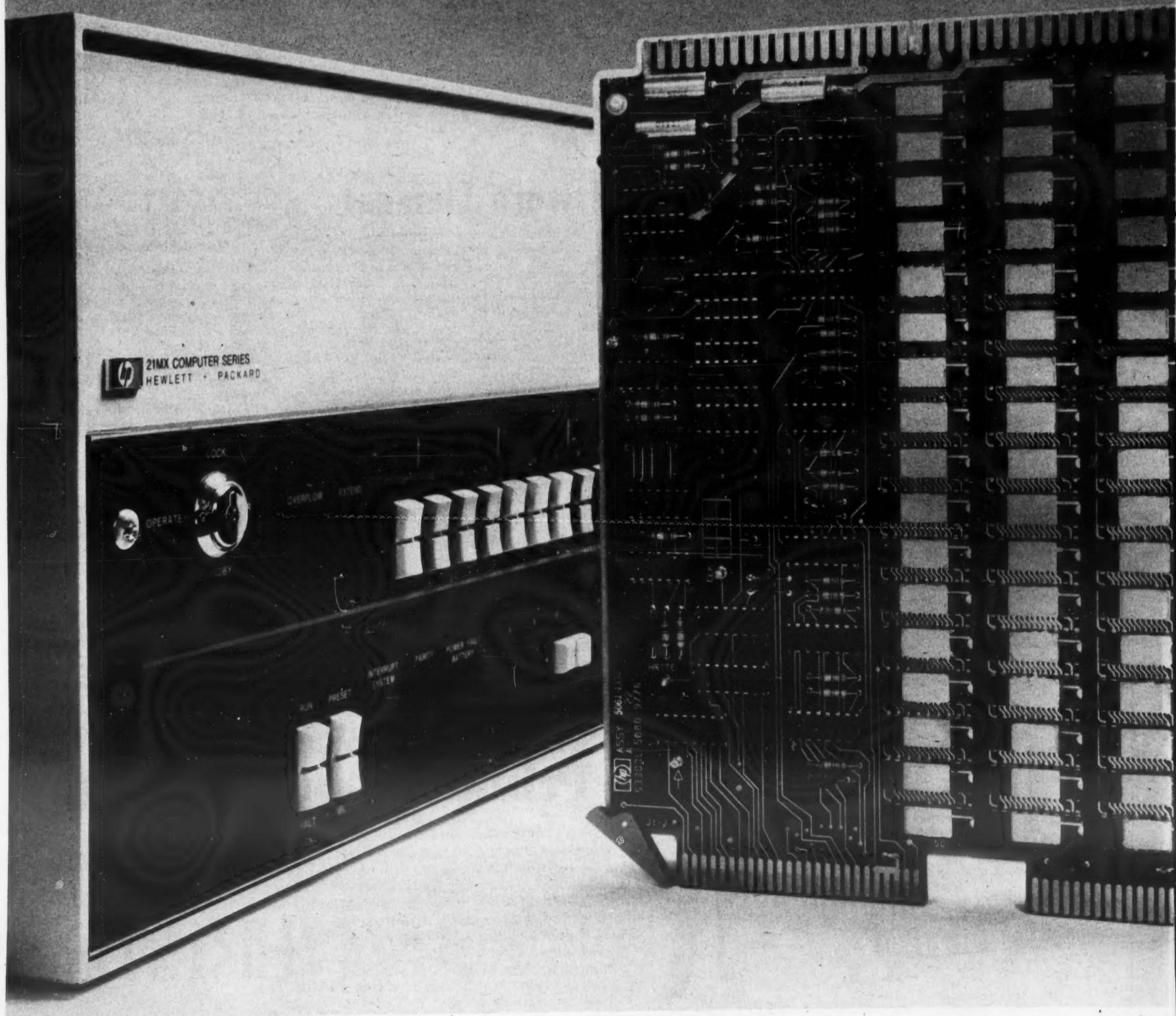
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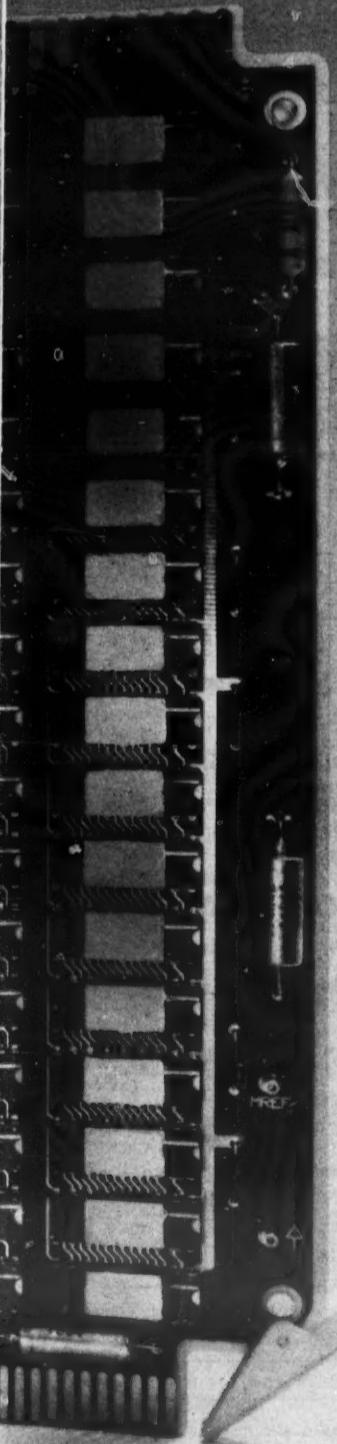
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DEC 11/34	\$2048.*	\$12,995.*
Nova 3/12	\$2368.*	\$14,528.*

†Includes CPU, parity memory, memory management, EAU and battery backup. Source: Datapro
*U.S. domestic price. OEM quantity 50.

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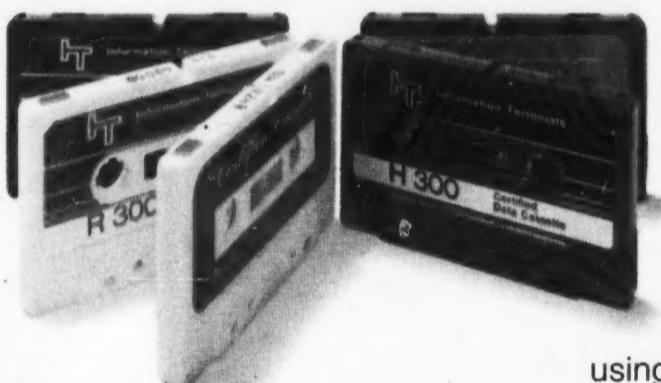
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Helps Handle Complex Calculations

Mini Opens New Market for Sprinkler Manufacturer

HIGH POINT, N.C. — With the help of minicomputers, a sprinkler systems contractor said it can now offer more cost-effective fire protection to its customers. Using a Wang WCS/30 and 13 WCS/20 systems, the contractor, High Point Sprinkler Co., can calculate hydraulic equations once too complex to be done by hand, according to William Honeycutt, hydraulic engineer for the firm.

Some kind of computer system was needed in order to bid on gridded piping sprinkler systems, Honeycutt explained. Gridded piping systems differ from looped or open-end systems produced by the firm because they use smaller pipe, but they provide the same amount of protection.

The smaller pipe reduces the cost of material and labor, he added.

Special Hardy-Cross calculations must be done to ensure the water sprinkler systems maintain sufficient water pressure, Honeycutt explained. Prior to the installation of the minis, the firm did not perform these calculations at all because the calculations would have taken three to six months to "balance" by hand, he estimated.

The Hardy-Cross is one of four software

packages High Point is buying from Hydratec, Inc., a specialized software house. The other packages are branch line estimating, branch line recall and underground estimating. The firm has also had payroll software developed for it by a local software house, Honeycutt said.

Water Pressure Crucial

Water pressure, he explained, differs in urban and rural areas and can be affected by the height of a building. Pressure sufficient to protect a department store might not be sufficient to protect a chemical plant; systems designers must also take the occupancy of a structure into account, he said.

The force of water in a sprinkler system depends on the length and diameter of the pipe, but the loss of pressure through

friction within the pipes must also be calculated. The Hardy-Cross package employs a special formula to calculate the friction loss within the sprinkler system and is necessary if grid systems are to be approved by insurance companies or other certifying agencies, he said.

The calculations show water pressure throughout the system will be sufficient to provide the required protection, he added.

When used in conjunction with the branch line estimating software package, the calculations can indicate a given length of pipe should be of a different length or diameter than the design originally specified, he said.

The system at High Point includes one WCS/30 and 13 WCS/20 processors. Each system includes 16K bytes of core and a

Model 221W printer.

Three of the WCS/20 systems use two 262K-word floppy disk drives, while the remaining use a single floppy disk. The equipment cost almost \$300,000.

Honeycutt chose the Wang models because that gear, combined with the software, seemed to be best suited to the combination engineering-business application the firm had in mind, he said.

Honeycutt considered six different computers before settling on the Wang systems, he said. The manufacturers demonstrated their systems in his office, he continued, but the hydraulic calculation software available through Hydratec for the Wang system seemed to be better than others he considered.

The cost of the system was considerably less than the others as well, he added.

Rolm 1650 Extends Ruggedized Series

CUPERTINO, Calif. — Rolm Corp. has announced another model in its ruggedized series — this one one-third the size of models with comparable computing capacity, it said.

Using LSI technology, the Model 1650 was designed for applications requiring small size and light weight. Such applications would include tactical aircraft, helicopters and mobile land vehicles.

The system uses double-density core memory. Included in a chassis measuring 5 in. by 7-3/4 in. by 12-1/2 in. and weighing less than 30 pounds are a 32K core memory, CPU and power supply.

The 1650 CPU is microprogrammed and executes 52-bit microinstructions with 150- and 250 nsec cycle times, the firm said. The entire CPU is packaged on a single "folded-board" circuit module, it added.

Three package configurations are offered: with external fins as a free-standing, conductively cooled system; with an integral heat exchanger allowing adaptation to an external forced air supply; or with a Rolm-supplied forced-air unit.

A basic Rolm 1650 with 32K of memory costs about \$23,000 in quantities of 20, a spokesman said from 18922 Forge Drive, Cupertino, Calif. 95014.

Recycled Mini Set To Give Health Data

(Continued from Page 41) tics, Beck said. Twenty decimal digits of information identify each patient, and this information is set by thumbwheel switches on the system.

The information is recorded and displayed on LEDs, so the operator knows even before he begins to record the EKG or other test that there is accurate patient identification, Beck continued.

The system includes the Minuteman CPU, a teletypewriter system, a cassette tape unit for program load and a 9-track tape unit, Beck said.

It will be joining the trailer caravan as soon as an inoperable tape drive is replaced. The system was developed under a \$41,000 contract awarded in June of 1975 from the National Center for Health Statistics and has been under development for over four years.

I know a guy who gets plenty of respect. He's a big business magnate. Travels all over. He just got back from Zurich. He went there to get his watch fixed.

But he tells me with all his money he's still got problems. The more business he does the more paperwork he gets. He told me it's driving him nuts! I told him, Don't tell me — tell 3M. If they can't help you, nobody can!

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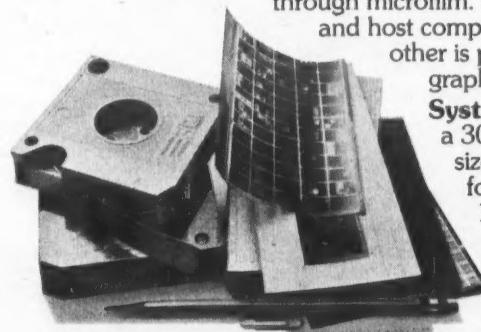
3M has the two best ways to get data from tape to end-user through microfilm. One uses laser-beam technology and host computer software and is totally dry. The other is programmable—and can even produce graphs and charts!

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INQUIRY/ims

An English-like Inquiry Language for IMS or IMS/VS

INQUIRY/ims allows users of IBM's Information Management System (IMS) to easily and efficiently access their data bases. INQUIRY/ims utilizes an English-like language and operates as a message, message batch, or batch program. The user does not have to know the physical characteristics or the detailed organization of the information stored in the data base.

INQUIRY/ims is designed for all users regardless of their technical orientation.

ELIMINATES APPLICATION PROGRAMMING.

Although IMS's Data Language/One (DL/I) provides the programmer independence from access method, device characteristics and data storage organization, user written programs are still required to retrieve information from a data base. INQUIRY/ims interprets English-like inquiries and converts them to the code required by DL/I to retrieve user requested information.

ARITHMETIC CALCULATIONS. INQUIRY/ims provides the capability to perform arithmetic operation on data fields and/or constants and to return the result for action by the verb in the inquiry.

PRE-STORED INQUIRIES AND ARITHMETIC FUNCTIONS.

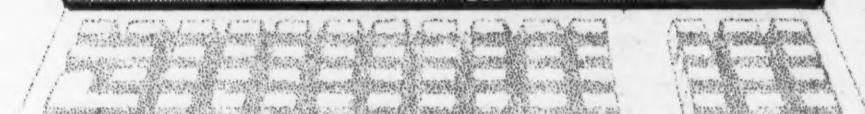
Frequently used or lengthy inquiries and functions may be stored in executable form and "called out" via a simple code eliminating the need to physically input the same inquiry or function over and over.

ALL TERMINAL TYPES SUPPORTED. In addition to the IBM 3270 type terminal, all IMS supported terminal types or their equivalent, IBM 2740, IBM 2741, TWX are supported by INQUIRY/ims.

MULTI-PATH LOGICAL OR PHYSICAL DATA BASES. INQUIRY/ims can retrieve and logically relate multiple fields from multiple paths in either physical or logical data bases.

ON-LINE AND BATCH SUPPORT. INQUIRY/ims will operate as a message processing program, as a batch message processing program or as a stand-alone DL/I batch program. INQUIRY/ims in no way modifies IMS, nor is it any more dependent upon a specific version of IMS than any other IMS user application program.

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TSO INTERFACE. INQUIRY/ims provides an interface against DL/I data bases in the inter-active TSO environment eliminating the requirement for IMS data communications. This interface can be used for both data base diagnostics during program development as well as a production inquiry capability.

OPTIONAL INPUT/OUTPUT. For an on-line inquiry any keyboard terminal can be used. However, INQUIRY/ims also supports batch mode operation in which inquiries can be made via a terminal or punched cards, and replies are made either to the terminal or a line printer.

TAILORED TO THE USER INSTALLATION. The standard INQUIRY/ims vocabulary and diagnostic message text may be modified by the individual installation. The vocabulary which contains all words used in the language can be added to or changed for each application area if necessary, and a vocabulary may be created in a language other than English. The diagnostic message text may be expanded or shortened depending upon the installation standards.

DATA FIELD SECURITY AT TERMINAL LEVEL. Access to a data base and the fields within the data base is possible only through the INQUIRY/ims user dictionary. Since a user dictionary may exist for each terminal user, the absence of the data field definition prevents retrieval of that data element and provides unauthorized access security at the field level.

PERFORMANCE INTEGRITY. In order to minimize IMS overhead INQUIRY/ims has implemented inquiry page and time limit specifications by IMS logical terminals. This capability allows a user to stop an inquiry after a page and/or time limit and free IMS resources.

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Bringing Mini In-House Lets Firm Add Product Lines

MOUNTAIN VIEW, Calif. — When a service bureau steadily raised the fee it was charging to handle this firm's accounts receivable, Award Service, Inc., switched to an in-house minicomputer.

The firm distributes and services products to large drug and grocery stores. It wholesales a range of items from pet foods to vacuum cleaner bags.

Although its accounts receivable was being handled by the service bureau, most of the work-up of data for the bureau was done manually, a spokesman said.

OS Important in Selecting Mini

(Continued from Page 41)

professionals. Using the files that have been established for data extraction and report generation is something to consider.

Cobol and RPG are somewhat more efficient business-oriented languages, but are more difficult to learn than Basic.

Fortran is not as effective a business language as Cobol or Basic and should be considered only for computer professionals. Assembly language is the most efficient language from a computer standpoint, but requires highly skilled professionals.

Some turnkey vendors and many manufacturers have offered new languages that are combinations of derivatives of Basic, Fortran or Cobol. One should be very wary of these new languages.

A compiler (the software that provides the use of a specific programming language) is very complex; it is generally developed and debugged over a long period of time.

Newly released compilers are less stable and more prone to error than compilers that have been in the marketplace for a longer period of time, and a compiler that has only a few users should not be considered.

In the request for proposals a vendor should be asked if he can meet the requirements described in the functional specification. If the vendor takes exception to any part of the specification, he should state what he proposes to do differently.

Quite often vendors will have generalized packages to meet certain application areas within your specification. Changing some parts of the requirements to fit the package may produce a considerable cost saving. However, that is a decision one must carefully evaluate.

Vendor Ability

The software vendor selected should have demonstrated ability in successfully completing software projects. A knowledge of your industry is helpful, but often more reassuring than pertinent.

A knowledge of business applications and a management orientation to the role a computer should play in supporting the goals of a business is probably more important.

The vendor should describe the steps he will go through in implementing your system and the time each one should take.

His approach should show enough time to do a complete system design and provide for sufficient testing and parallel operation so that the installed system works effectively.

More critical than the actual coding is the transformation of the functional specification into a detailed design specification. Vendors should be asked to show detailed design done for other clients. The design should be examined for completeness, professional look and organization.

It should contain an overall system flow chart, applications flow charts, narratives of processing routines, input layouts, report layouts, screen layouts, file layouts

Salesmen wrote on carbonized forms; clerks "extended" this information — collated and reworked it for other forms — and then it was sent to the bureau. A week later, the computerized reports and invoices were returned, the spokesman added.

The company first purchased a Model 400 small business computer from Basic/Four Corp. in Sept. of 1974, but has since upgraded to a Model 600.

The configuration at Award includes the 600 with 32K of core, two 5M-byte disks, three terminals and a 300 line/min print-

er. The system costs about \$75,000, Robert Cassese, controller, said.

Award considered NCR and IBM before choosing Basic/Four. Cassese visited an operation similar to the one Award was planning to run and was impressed with the way the system was working.

Altered Approach

The on-site system also altered the firm's approach to handling merchandise paperwork. Previously the salesmen filled out carbonized order entry forms as they visited customer stores, and the merchandise would be delivered a week later.

The computerized bills came much later.

Now, after the salesman writes his order in the field these are checked off by the mini and sent to the warehouse or plant with an invoice attached.

When the salesmen delivers the goods, the invoices arrive with the items.

The company has expanded the number of product lines it distributes from three to 18.

Two clerks working at the minicomputer terminals handle the larger chore. "There's no way we could have maintained the manual system," Cassese said.

The system is also providing two types of sales analysis. Each night it puts a report on all of the company's customers — what each bought, where the bill was sent, the dollar volume, what product groups were being stressed.

This daily report is used by the sales department to gauge its activities and quickly spot lines that are growing in volume and others that are slipping.

Once a month the computer produces a store-by-store series of three sales reports: the volume of each store per account, the weekly service average (including year-to-date figures) and all the products each store has bought during the month.

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You probably think of Northrop for our leadership in the development and on-time delivery of specialized aircraft and airborne electronics systems.

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in these fields, the customer gets specific solutions to specific problems, without the risks that accompany in-house software development. Also, the customer enjoys the privacy, cost savings and increased efficiency of an on-site installation that handles every detail of his operation, from insurance form processing and patient accounting to sales order processing, inventory control, general ledger, payroll, billing, daily management reports and more, much more.

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users throughout the country.

We've also made it convenient for consultants and potential customers to see first-hand what a Northrop Business Computer System can do. Our systems are installed in presentation vans so that, at your convenience, we can give you a personalized demonstration at your facility.

Contact Northrop Data Systems, Inc., at 19000 So. Vermont Ave., Torrance, CA 90502 (213-532-1510).

NORTHROP
Data Systems



Imsai Programmable Device Based On Intel 8080 Microprocessor Chip

SAN LEANDRO, Calif. — IMS Associates, Inc. (Imsai) has a programmable digital microcomputer based on the Intel 8080 microprocessor chip and containing the necessary circuitry and power supply to make the system operational, the firm said.

Designated the Imsai 8080, the system is said to be designed for commercial OEM, laboratory prototype and central processing applications.

The system is constructed

around an aluminum card cage and printed circuit motherboard that accommodates the front panel and up to 22 plug-in cards for memory and I/O interfaces, the firm said. The system can be expanded to 64K bytes of memory.

A floppy disk controller, audio tape cassette, printer, video terminal and teletypewriter can be used with the system.

The system costs \$599 in kit form, \$931 assembled.

IMS also introduced a 4K ran-

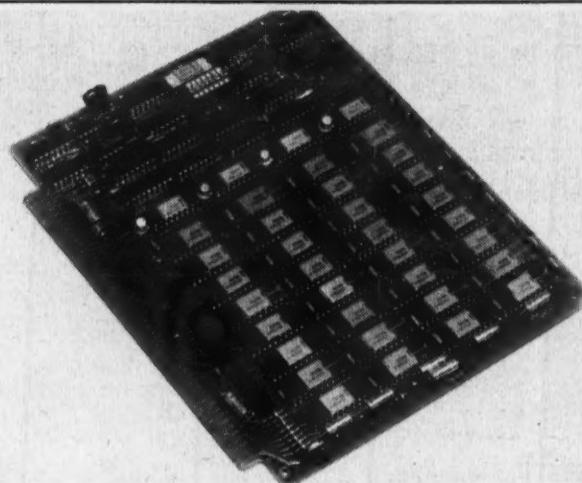
dom-access memory board for use with the Imsai 8080 and the Altair 8800. The memory board allows 1K-byte blocks of mem-

Micro Products

ory to be write-protected under program control or via front-panel switches, the firm said.

Two LEDs are attached to each 1K-byte block of memory; the first indicates when its memory block is write-protected and the other when the block is enabled for read or write, the firm said.

The board costs \$139. The 8080 and board are available from the firm at 1922 Republic Ave., San Leandro, Calif. 94577.



Intel Adds to Memory Line

SUNNYVALE, Calif. — Two more memory systems for microcomputers are available from Intel Memory Systems.

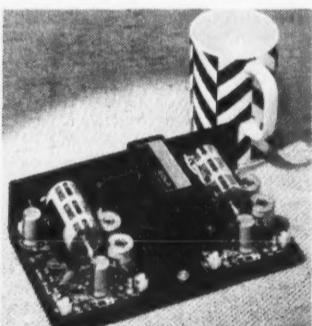
Part of the 481 series, these systems store 16K bytes per board. The memories are built with high-speed 4K dynamic random-access memory circuits, with refresh and interface circuitry on a single board.

The IN-481-1 is compatible with Intel 8080A microprocessor-based systems; the IN-481 is compatible with Intel 8008- and 8008-1-based systems. Both cost \$975 from 1302 N. Mathilda Ave., Sunnyvale, Calif. 94086.

Sola Offers Micro Power Supplies

ELK GROVE VILLAGE, Ill. — Sola Electric has an eight-model line of multiple-output power supplies for OEM use in microprocessors.

Four dual-output models and four triple-output models provide popular output-voltage



Sola Power Supply

combinations, the company said. Several units have outputs adjustable to conform to precise voltage requirements of the application, a spokesman added.

Output levels are designed to accommodate random-access memories, read-only memories, clocks and input/output devices as well as microprocessor logic.

Input voltage range is 104 to 127 or 208 to 254 VAC, with a frequency range of 50-400 Hz. All models have automatic current limiting, short circuit protection and reverse voltage protection.

Prices range from \$49.95 for dual-output supplies to \$84.95 for the triple-output units in quantities of one to nine, the firm said from 1717 Busse Road, Elk Grove Village, Ill. 60007.

Rockwell Has PPS-4/1

ANAHEIM, Calif. — The PPS-4/1 from Rockwell International is said to be a complete one-chip microcomputer containing 1K bytes of eight-bit read-only memory, 96 four-bit words of random-access memory and 31 I/O channels with interrupt capability.

The unit is priced "under \$10 for medium quantities," Rockwell said from 3310 Miraloma Ave., Anaheim, Calif. 92803.

SAN DIEGO, Calif. — A read-only memory (ROM) emulator from Genesys is being offered for programmers doing development work, the firm said. The programs can be written and debugged on a random-access memory (RAM) before finally being "burned" into the ROM, it noted.

The RE8192 can be configured to emulate any ROM or pro-

grammable ROM up to 1K-bit words with an access time of 50 nsec at the emulator attachment point, the firm said.

The unit with RS-232/current loop control and configuration jumpering from 32K to 1K words and word lengths from one to eight bits costs \$1,776, the firm said from 11120 Roselle St., Suite H, San Diego, Calif. 92121.

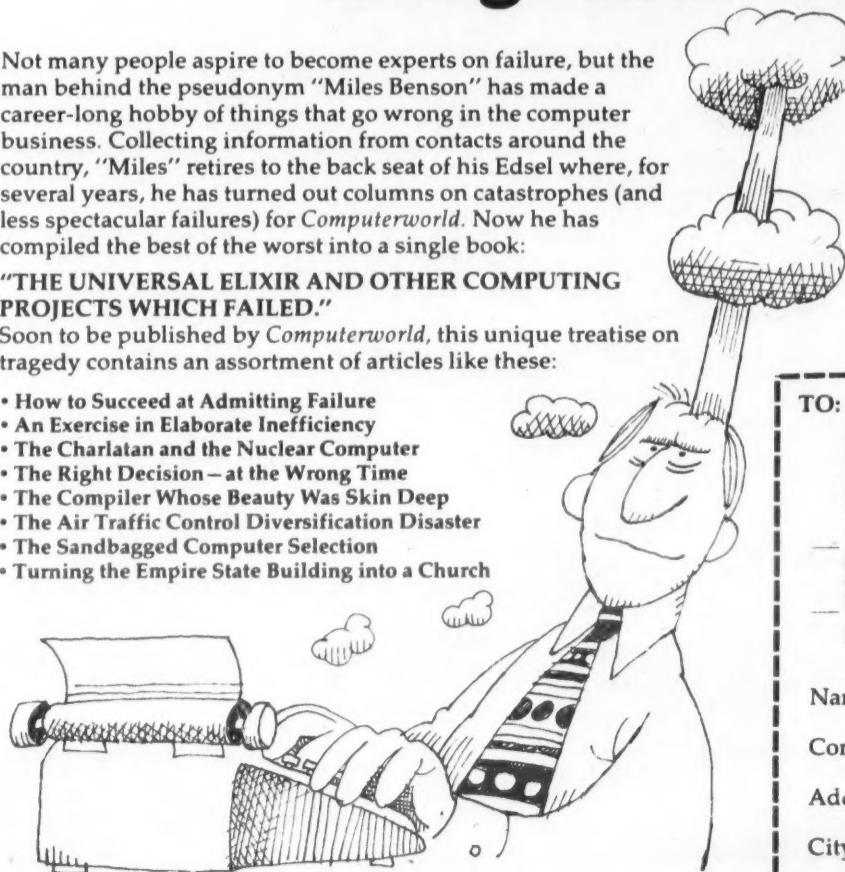
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Evaluated Various Methods

World Trade Corp. Felt Compelled to Unbundle: Memo

By Edith Holmes
Of the CW Staff

NEW YORK — "Why do we unbundle? Because we are forced to!" an IBM World Trade Corp. (WTC) executive wrote his superiors in March 1969.

"Failure in WTC to follow in the direction set up by [IBM] domestic will generate the belief that IBM changes its practices only when put under pressure with legal action and [when] discriminatory practices are applied to foreign markets in order to keep IBM's dominant position," M.M. Simond, a member of the corporate planning staff, said in a memorandum written to Jacques G. Maisonneuve, an

IBM vice-president and president of WTC, and two other WTC executives.

"Foreign governments know that IBM is under pressure to change its pricing policy in order to make the market more competitive and in order to make IBM lose some of its dominance in the market. They have the same aims," Simond said in the memo recently put before the court in the U.S. vs. IBM antitrust trial.

The government offered the document as part of the evidence for its charges IBM kept its prices bundled as long as possible to maintain its monopoly position.

IBM counsel objected to admission of the document into evidence, saying "the

opinion of a lower level World Trade employee concerning the desirability of such a step for IBM WTC is irrelevant to this case."

End of Era

Overall, Simond expected unbundling to mark the end of an era in the industry, to stimulate the market and to depress the overall profit ratio of the computer systems business.

Unbundling would permit substantial growth of software companies that, with an investment of \$20,000, some talent and a couple of contracts, easily could achieve a turnover of \$1 million, he said.

Unbundling would cause IBM to enter the software companies' market — they wouldn't enter IBM's market. "We will not be in a position to set the rules of the game as we did up to now in our market," Simond stated.

Start Firms

He further suggested IBM programmers would leave the company to establish their own software businesses and, if software houses proved capable of turning out good operating systems, there would be increasing demand for hardware with minimal software.

More usable software on a fee basis would make it difficult for IBM to justify high hardware prices, Simond continued. Hardware would "lose its glamour" and prices and profits would fall.

Unbundling would also lengthen the time users would keep the hardware configuration they have, he added in the memo, because of the cost of changing programs and the possibilities of programming efficiency.

Three Options

Discussing IBM's unbundling options with his superiors, Simond noted there were infinite variations, but three would serve to "illustrate the basic struggle between three types of interest — the mar-

(Continued on Page 54)

SBS Says Plan Meets FCC Requirements

By Molly Upton
Of the CW Staff

WASHINGTON, D.C. — The structure of Satellite Business Systems (SBS) and its relationship with its parent and affiliate firms comply with the "letter and spirit" of the Federal Communications Commission's (FCC) requirements for a separate corporation, not a mere division of IBM, SBS said recently.

In a reply to Walter R. Hinchman, chief of the FCC's Common Carrier Bureau, SBS observed the FCC had not precluded officers and directors of IBM from serving on the Partners' Committee of SBS.

Hinchman had asked SBS for information to clarify the FCC's doubts whether the "integrated control" by management members of IBM who also hold responsible positions in IBM's subsidiary and SBS met in the FCC's stated requirements for a separate corporation with "arms-length transactions" between the IBM parent and the subsidiary.

Under the plan submitted to the FCC, the three principals in the venture — IBM, Comsat General Corp. and Aetna Casualty and Surety Co. — would each form a subsidiary which would then become a partner in SBS [CW, Dec. 31-Jan. 5]. IBM's subsidiary is called IBM Information Satellite Corp. (IBMS).

The FCC requirements as stated in the eligibility decision for separation of SBS personnel from those of its parent and affiliates are satisfied because day-to-day operations will be wholly independent of these other firms, SBS said.

"The eligibility decision does not suggest or imply that the parents of any joint domestic communications satellite venture that includes IBM and Comsat as participants (through subsidiaries) would be barred from participating in the policy direction of the venture," SBS said.

For the partners to abdicate control and

responsibility for SBS policy "would be a breach of corporate responsibility to shareholders" as well as make a mockery of the control provisions of Section 310 of the Communications Act, SBS said.

Policymaking Plans

SBS' plans for policymaking are proper, SBS said, observing the FCC requirements do not "extend to barring the parent corporations from seeing to it that the policymaking, nonoperational organs of SBS are filled with top executive personnel capable of reaching prompt, wise and far-reaching decisions that will be honored by the respective partners."

SBS had previously told the FCC "no director, officer or employee of any of the partners or their affiliates may be an officer or an employee of the partnership" if the commission were to approve the satellite venture.

However, the SBS letter said this does not preclude such personnel from holding positions on its Partners' Committee or Executive Committee, whose functions it likened to those of the board of directors and executive committees of such boards in corporations.

These committees "will exercise control of and give direction to the business of SBS primarily through the establishment of policies and objectives for the venture," SBS continued.

These include adoption or modification of annual business plans and budgets, the appointment of SBS officers and the approval of substantial agreements between the partnership and a partner or any affiliated officer or director of any partner.

SBS' officers and staff will initiate and submit for approval to either or both committees business plans and budgets and other matters relating to the operation of the partnership, such as facilities

planning, marketing, purchasing, sales, etc., SBS said.

Once proposals are approved, the execution and implementation will be the responsibility of the president and officials who report to the committees on a regularly scheduled basis.

The president is the chief executive officer and has the appropriate authority needed to administer general operations and management.

(Continued on Page 54)

Forms Makers See Orders Rise, Price Squeeze on Stock Items

By a CW Staff Writer

Orders for continuous forms are up over those of a year ago, but the prices of stock items tend to be low, three business forms suppliers recently indicated.

One industry spokesman observed that the volume of forms has improved compared with a year ago, but "prices are not very good."

While some said there is active price cutting in the off-the-shelf items, John W. Reed, vice-president of marketing for Standard Register Co., said a more significant factor in keeping prices down has been the increased acceptance of partial groundwood paper in place of bond.

The partial groundwood, he said, is used almost exclusively in stock forms and costs about 15% to 20% less than the equivalent forms in bond.

Lately, paper mills have been producing the groundwood paper in off-white tints rather than the previous green tint, and this has helped increase its acceptance, he said.

Also, he observed, there tends to be

keen price competition among stock forms suppliers when the economic climate is suffering.

Business is substantially better than last year in real terms as well as dollars, with the upswing starting in the last six months, he said.

The industry is generally six months behind the general economy, he explained, and was even more so because of the stockpiling that occurred as a result of the shortages in 1973 and 1974.

Ted Dimitriou, president of Wallace Business Forms, Inc., said incoming orders are up and he expects demand for forms will follow the general path of economic recovery.

Matter of Time

All three agreed paper suppliers have held their prices, if not increased them. None was willing to hazard a guess when there would be a shortage of paper, but they generally agreed it is a matter of "when" and not "if."

(Continued on Page 51)

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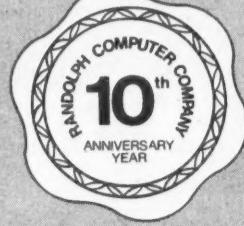
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IBM Executive's Market Figures Questioned at Trial

By Edith Holmes
Of the CW Staff

NEW YORK — "This witness' credibility has been called into such serious question that I wish to give him every opportunity to explain some of his testimony," Judge David N. Edelstein said after hearing the testimony of Francis G. (Buck) Rodgers, currently IBM vice-president of marketing.

Rodgers was the first IBM executive called to the witness stand by Justice Department attorneys in the U.S. vs. IBM antitrust trial.

Rodgers stated he never used notes nor did he indicate IBM's market share in his presentations to IBM's board of directors when he was president of IBM's Data Processing Division (DPD) between 1967 and 1969.

He only used percentages to describe how seven of IBM's major competitors were doing in relation to each other, he said.

Figures contained in the slides he used before the board in 1969 indicated Honeywell had 10%; General Electric, 11%; NCR, 16%; Burroughs, 19%; and RCA, 6%.

All of these companies had improved their positions with regard to all non-IBM competition in that year, he told the IBM board.

Companies that had suffered losses by comparison to their non-IBM competition were Control Data Corp., 9% of the market; Univac, 8%; Xerox Data Systems, 3% and "other," 18%.

Rodgers said "other" included such firms as Texas Instruments, Hewlett-Packard, Digital Equipment Corp., Varian, Interdata, Telex, Storage Technology,

Forms Orders Rising, But Makers Feeling Price Pinch on Stock

(Continued from Page 50)

Reed observed it could be within a year, but not before the end of 1976.

Commenting on the depressed stock forms prices, Dimitriou said he hopes to see a better pricing situation later in the year, but added that he doubts this will happen since "there's too much capacity out there."

However, prices have gone up steadily on custom forms, he said.

The large nonimpact printers, such as those from IBM, Honeywell and Xerox which transfer images of forms onto the plain paper they use, could impact the stock forms business to some extent, he said.

Unless suppliers announce a second increase this year, Standard Register should be able to avoid a further increase since it raised prices in January, Reed said.

Delivery times of stock forms has not changed at Standard, he said, but custom forms might take about a week longer than they did four or five months ago. "But it's still in the normal range, about 45 days," he added.

In general, Wallace is delivering faster than last year, Dimitriou said.

McGraw-Hill Buys Datapro

NEW YORK — McGraw-Hill, Inc. has acquired Datapro Research Corp. which provides information services on computers and automation products.

Datapro will continue operating from its headquarters in Delran, N.J., under President John Kalbach and its other executives.

As a wholly owned subsidiary of McGraw-Hill, Datapro becomes part of McGraw-Hill's Information Systems Co. The acquisition was made for a cash down payment plus a contingent earnout arrangement, a spokesman for McGraw-Hill said.

Sanders Associates, Mohawk Data Sciences, AT&T and Raytheon.

Never Used Documents

Quietly putting his glasses on and taking them off as he reviewed the drafts of his three board presentations, Rodgers stated these documents had been prepared by subordinates. But, he added, he never used them in giving these speeches. "I never use notes. I am more comfortable without being tied to any draft or outline of any kind," he said.

Figures in the 1967 draft indicated IBM continued to be the leader of the DP industry by a substantial margin with three-quarters of the market.

The 1968 draft stated IBM had a 73.4% market share. The government suggested Rodgers had read these drafts as scripts of his presentations to the board, but he denied this.

"I did not review market share figures

with the board because I did not feel the numbers were accurate enough," he said.

"In DPD we have a reporting procedure where salesmen report on competitive [net sales record increase] orders that they find."

These numbers are inaccurate, Rodgers stated, because salespeople have no way of knowing how much of the competitive equipment they actually see.

The three-quarters figures were probably from the Competitive Statistics (Comstat) reporting procedures in IBM and as such were not "accurate or worthy enough" for presentation to the board, he said.

Comstat information was of use from "a trending point of view" and it was only in that sense that he presented competitive figures to the board, he added.

Asked why the people who prepared these drafts included share figures although he regarded them as inaccurate,

the IBM executive stated he didn't know and indicated they included all information they thought he should have. Normally a DPD vice-president worked with Rodgers on the presentation to the directors.

Several IBM employees in the courtroom later said the man dressed in a three-piece subtle green and brown plaid suit sitting quietly in the witness box was one of the most dynamic speakers IBM has.

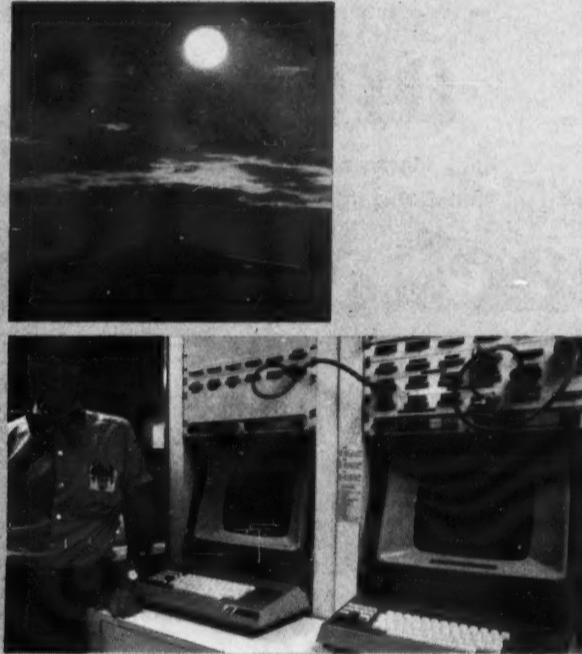
These observers stated they had never seen him use notes or stand still at a podium. He prefers to walk around with a microphone, they said.

Rodgers told the court he follows this style of speaking in the 75 or more talks he now gives each year in and out of IBM.

Yet others in the courtroom wondered how presentations to IBM's board on the status of DPD could omit comments on IBM's market share.

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from Wang Laboratories (F); the new MX/65 DISComputer from Hewlett-Packard (G); Electronic Memories & Magnetic's line of micro-memories, mini memories and new 8080 microcomputer (I); Diablo's new 400 Series Disk Drive (J & K); Paradyne's LSI Modems (L); Lockheed's System III business computer system (M); the new 600 series remote processing family (with a ribbon and a bow) from Entrex (N); Varian's new "Pronto" software program (O); Data 100's complete OEM product line (P); and INSCO Systems' Programmer Knowledge Survey, used to objectively measure the working knowledge of OS/VS programmers (Q).

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Orders & Installations

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The U.S. Interior Department's Mining Enforcement and Safety Administration will install a Honeywell Series 60 computer to help meet its projected DP requirements for the next five years.

The U.S. Postal Service will install Lockheed Electronics Co.'s Energy Management System for control and conservation of electricity at its bulk mail facility in Kearny, N.J.

The State of California has installed Abadas from Software AG as the data base system available to state agencies using the Stephen P. Teale Consolidated Data Center.

The Turlock Irrigation District in California has ordered a Supervisory Control and Data Acquisition system from Honeywell's Process Control Division.

Sundance Photo, Inc., has installed a Burroughs B700 system for payroll, invoicing, order tracking, order inventory and various statements.

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29 Software Packages Join ICP \$1 Million Club

CARMEL, Ind.—As evidence of the growing popularity of packaged software, 29 packages achieved ranking this year in International Computer Program, Inc.'s (ICP) \$1 Million Club, bringing the total number in this category to 65.

But in the \$2 Million Club, there were 35 new members out of a total of 73. Membership is awarded in these categories for packages that have attained sales in these amounts.

In the \$5 Million Club, there were seven new members out of 17. Activity was brisk this past year in the \$10 Million Club, with six of the eight members new.

The total for the \$20 Million Club still stands at one (Scert 76 from Comten, Inc.), with no new entrants, but a new category was created, the \$30 Million Club, with two members—Total from Cincom Systems, Inc. and Mark IV Systems from Informatics, Inc.

The ICP initiated the Million in One award for those packages that attained \$1

million in sales within a year of introduction. Two packages achieved this status in 1975: Policy Management System from Seibels, Bruce & Co. and the MMS Net Change Materials Requirements Planning System from Software International Corp.

The other members on the list included two from Informatics, Life-Comm III System and Mark IV, as well as Quick-Draw from National Computer Analysts, Inc. and Pansophic Systems, Inc.'s Easytrieve.

Last year was the only year to produce two members in that category.

Another new award, reflecting the popularity of certain packages in yet another way, was the Industry Association Award for packages installed at more than 2,000 user sites.

Applied Data Research, Inc.'s Librarian qualified with 3,000 sites while Pansophic Systems' Panvalet had 2,700.

Memo Weighs WTC Unbundling

(Continued from Page 50)
ket, IBM and the U.S. government."

IBM could make no change in hardware price and offer software and certain services at some price. This would be equivalent to a price increase or a withdrawal of commitment on the part of IBM, Simond said.

Such a move would be understandable if the industry were in financial trouble, but such was not the case, he added.

The market would be antagonized by this course of action, he observed. The government—not as a user, but as a monitor of the economy—would be satisfied because IBM would lose its market position by allowing a great deal of opportunity for competition.

IBM would also be satisfied because it would maintain high profitability and satisfy the government by putting itself in a track to lose market position, Simond reasoned.

A second unbundling option would be a 2% reduction in hardware price and the addition of software and certain services offered at a price.

"This is unbundling from a manufacturing cost approach," he wrote. "This is the manufacturing compromise which satis-

fies everyone a bit but pleases no one."

The market "gets a token gesture far from its expectations; the government receives a token gesture as a user and the hope that competition can move still further and make IBM lose its market position as a monitor; IBM maintains its status quo."

Simond outlines a third unbundling approach with 5% or more reduction in hardware price with software and certain services offered at a price. "This is unbundling from a utility point of view," he said.

With this option, the market would be happy as it started fulfilling its expectations; the government as a user would be satisfied, but dissatisfied as a monitor to the extent that IBM would not lose its market position, he observed.

IBM's profit ratio would start dropping quickly, but the corporation would keep its position, Simond suggested.

Believing IBM domestic would select either the first or second option, he urged WTC to offer a variety of unbundling approaches to users, noting the geographic and other disparities in the WTC marketplace.

SBS Says Plan Meets Demands

(Continued from Page 50)

Various departments will be under the supervision of full-time SBS officials, the reply continued.

SBS currently has a full-time staff of 88 persons, 43 of whom are directly employed by SBS and 45 of whom are on full-time assignment on a fully reimbursable basis from partners.

Focused on Separation

"Since it was clear to us that the purpose underlying the commission's maximum separation policy was to separate operating organizations of parent and subsidiary, we focused on making certain that SBS was separated from the operating organizations of the partners and their parents," the SBS reply indicated.

The FCC requirement "that any IBM participation in a domestic satellite system be isolated from IBM's other activities" has been accomplished to a "degree unprecedented in any previous application of the commission's corporate separation policy" through SBS' tripartite ownership structure and business organization, SBS said.

In fact, the tripartite organization of SBS "went well beyond the commission's

minimum separation requirements."

Holding Company

Accordingly, "IBMS was reduced to the status of a holding company which has no need for separate offices or full-time employees."

In accordance with FCC restrictions on Comsat and Comsat General personnel, "you will note that cross-officer relationships have been avoided with respect to IBM, IBMS and SBS." Also, "IBM officers and directors are on the board of IBMS, and officers and directors of both IBM and Comsat serve on the Partners' Committee of SBS," the letter said.

Orders for BR Unit Roll In

TRUMBULL, Conn.—Bunker Ramo's (BR) Information Systems Division has received customer contracts totaling \$46.9 million for its Bank Control System 90.

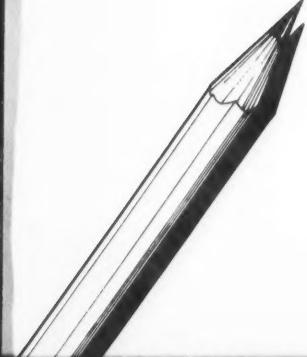
The contracts represent over 13,000 on-line terminals and more than 1,600 minicomputers.

Shipments are in progress, with installation and maintenance being performed by Bunker Ramo's field staff.

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Units First in Production

HP's Latest Offering Signals New Introduction Method

By Molly Upton

Of the CW Staff

NEWTON, Mass. — Hewlett-Packard Co.'s (HP) announcement of 18-pin 4K random-access memories (RAM) signaled a "basic change in philosophy in introducing new products," according to Ted Doyle, marketing manager for the Data Systems Division.

HP does not intend to announce new products until it has them in production, he said in a recent interview here.

Calling this a "very conservative approach," Doyle added it might take two or three years to derive benefits from this policy.

"What's needed is credibility," he said.

When HP announces a product, units will be in field centers and the service force will be trained on it, he added.

Delivery for the 18-pin memory modules [CW, April 19] is eight weeks, he said. HP had experienced delays in coming out with the 18-pin RAMs, the company said.

Prices Coming Down

Through the use of 18-pin RAMs instead of the current 22-pin units, the firm is reducing its memory prices by 30%.

Doyle said he foresees similar memory price reductions in the next couple of years.

The RAMs are supplied by Texas Instruments and HP is evaluating 18-pin parts from RCA and Advanced Micro Devices for second-source purposes, Doyle said.

In addition to price benefits,

users can experience increased throughput by putting more of their operating systems in larger main memory, Doyle said.

The 18-pin modules can be mixed and interchanged with the current 22-pin boards, he said.

The largest HP 21MX minicomputer can handle up to 128K words in the chassis and an additional 128K words with an extender, giving 256K words, he said. HP's memory mapping for the 21MX can theoretically handle up to 1M words, he added.

The effects of the recession on 21MX line bottomed out last summer, Doyle observed, noting sales have been picking up at a fairly good pace since then. There have been no significant changes in the traditional 50-50 ratio of end user and OEM customers, he said.

Ensuring Reliability of 4K RAMs

Tougher Task Than HP Anticipated

CUPERTINO, Calif. — Ensuring reliability in semiconductor memory components has been quite a task at Hewlett-Packard Co. (HP), which delayed introduction of its modules incorporating 18-pin 4K random-access memories (RAM).

"Building minicomputers which deliver the reliability promised by 4K RAMs has turned out to be tougher than anyone expected," according to Richard Anderson, general manager of the Data Systems Division.

As the prices are reduced, Doyle said customers tend to pay the same and receive more capabilities.

The price decrease has been broadening the market for the 21MX, he said, adding he expects the trend to continue for the near future.

For the year, Doyle forecast a 30% increase in revenues from 21MXs, but added the shipment rate should rise even more rapidly.

Two Perceptions

When asked about the breadth of the HP minicomputer line, Doyle said there are two ways of looking at the broad line approach. While HP does not have products in the micro area, it does provide a wide variety of systems for various applications within a particular firm, such as

a manufacturing facility, he said.

For instance, HP offers computerized test capability and scientific laboratory instrumentation, as well as data processing for corporate purposes.

"If you look at our product line from the systems point of view, I think we have a broad product line," he said.

HP's 21MXs can range in price from \$15,000 to \$100,000, he observed.

The Data Systems Division has been emphasizing software pertaining to real-time operating systems, especially for distributed systems, he said.

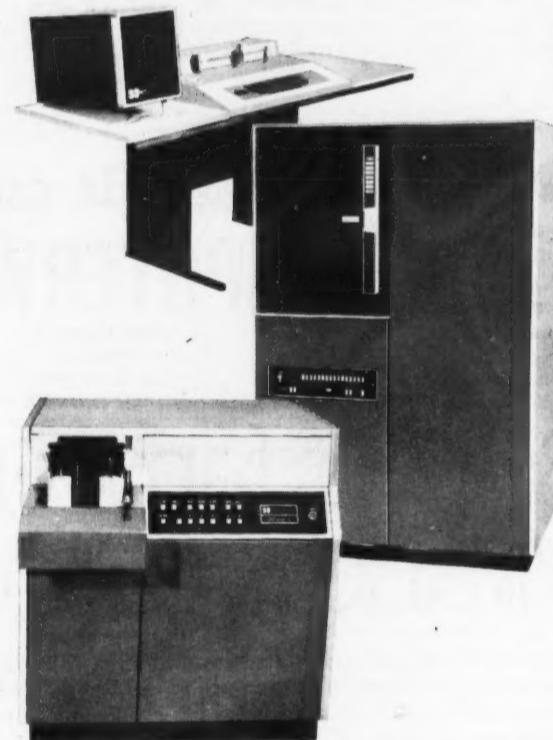
Doyle, who was one of the first

salesmen of HP computers, said the company has maintained a low profile while innovating in most areas.

Since 1966, most major developments in the mini area have been made by HP and picked up later by others, Doyle said — only the world doesn't know HP had them first, he added.

He listed as HP "firsts" relocatable code on the 2116A, a disk operating system on an early version of the 2116B, data base management systems on minis in 1971. In 1968 the firm hooked up 32 terminals to a mini, he said.

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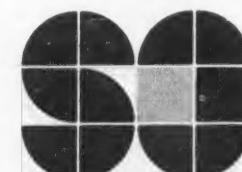
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"With the design changes that have taken place and our part-conditioning and part-screening processes, we are now ready to announced availability of our high-density memory system," Anderson concluded.

Recalling HP's experience with 22-pin RAMs in its 21MX minicomputer, Doyle, marketing manager of the Data Systems Division, said "at times our inspectors were rejecting as high as 20% of the incoming RAMs."

"Nevertheless, because of scrupulous testing and burn-in, long-term mean time between failure of the 21MX has always been better than that of our earlier, core-based machines."

Robert J. Frankenberg, Data Systems engineering section manager in charge of 21MX minicomputer development as well as memory reliability evaluation, said "the real breakthrough for assuring reliable 4K RAM performance in our products came when we developed a way to identify which integrated circuits will fail early."

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Federal Government Pondering Change in Acquisition Procedure

WASHINGTON, D.C. — The Federal government is considering whether agencies should be required to evaluate DP equipment and teleprocessing service performance quantitatively — through use of remote terminal emulation — before it is purchased.

Run jointly by the Commerce Department's National Bureau of Standards (NBS) and the General Services Administration's (GSA) Automated Data and Telecommunications Service (ADTS), the program evaluating this technique could lead to a revision of federal DP procurement regulations, according to Theodore Puckorius, GSA's commissioner of ADTS.

Remote terminal emulation uses an external computer system as a "driver" to provide a test workload to the DP system under consideration.

As the government now sees it, an agency looking for new equipment would provide each vendor with detailed specifications on the anticipated workload, such as the typical transaction or inquiry se-

quences the system would be expected to perform.

Each vendor would then program an interactive benchmark that represents the specified workload and provide the results of the test for the agency to consider in its overall evaluation, according to Thomas N. Pyke Jr., chief of NBS' Computer Systems Engineering Division.

The vendor's remote terminal emulation equipment would have been previously validated by the government as being suitable for use by federal agencies, he added.

The evaluation program, aimed at helping federal agencies obtain and use the least expensive equipment and services that meet their needs, is an outgrowth of NBS' work in teleprocessing performance evaluation, the standards organization said.

NBS will issue a Federal Information Processing Standard (Fips) guideline on remote terminal emulation as an evaluation tool this summer, a spokesman said.

Space Bank Closing on July 23

NEW YORK — American Express Co. plans to terminate operations on July 23 of Space Bank, its computerized hotel and car rental reservation system operated since 1968.

Airline Competition

After July 23, services will be maintained solely for Mutual Computer Services, Inc. (MCS), a subsidiary of Continental Airlines, while MCS implements its own hotel reservation system for its

airline customers.

"With the recent announcement that several major airlines would provide travel agents with a similar system of their design, and the ongoing discussions concerning industry-sponsored systems, we believe the reservations environment is in a state of flux which likely will result in functions such as those served by Space Bank being no longer viable," according to Maurice Segall, president of the Card and Reservations Divisions.



Results Decline in First Quarter at NCR

DAYTON, Ohio — NCR Corp.'s revenues and earnings declined in the first quarter, but the company expects improved results for the balance of the year.

"We believe a modest improvement in revenues and earnings for 1976 as a whole compared with 1975 results is attainable," according to William S. Anderson, chairman and president.

He attributed the first-quarter earnings decline to below-normal worldwide manufacturing activity and substantially lower profits reported by several international subsidiaries including NCR Japan, Switzerland and France.

This was in contrast with the first quarter of 1975, when earnings in those countries and most other international markets were at a high level.

Incoming domestic orders rose 62% over the comparable period of 1975. The gains were paced by strong demand for retail store systems and computer systems.

Record March

Domestic orders in March were the highest ever recorded by NCR for a single month, Anderson said.

Outside the U.S., orders in March established a record for that month. This brought first-quarter bookings abroad to approximately the level of a year ago.

Revenues totaled \$471.1 million compared with \$478.9 million in the 1975 quarter. Earnings were \$13.2 million or 54 cents a share compared with a restated \$20.8 million or 84 cents a share for the year-ago period after reflecting accounting changes in both periods.

The 1975 first-quarter earnings were originally reported as \$14.3 million. The restatement reflects an accounting change for contingencies, which resulted in the release of the company's international operations reserve of nearly \$6.6 million.

to 1975 first-quarter earnings.

A change in accounting for foreign currency translation added \$5.6 million in the 1976 period because of the cumulative effect on retained earnings as of Jan. 1.

The accounting change also resulted in a \$600,000 reduction in 1976 first-quarter earnings from what they would have been if determined by the accounting principle in effect in 1975, NCR said.

High Overhead

"Reductions in manufacturing schedules during 1975 resulted in a favorable \$134 million decline in inventories last year," Anderson said.

"However, this lower production output and the reduced amount of space required for electronic manufacturing have

resulted in excess capacity and a higher than normal level of unabsorbed overhead costs," he added.

"Although we are continuing to avoid excessive inventory buildups, anticipated market requirements for the remainder of 1976 will necessitate production increases at most NCR plants as the year progresses, and this is expected to improve operating results," Anderson said.

"Assuming continued improvements in the business climate domestically and abroad, we look for the second quarter to be substantially more profitable than the first quarter before the effect of the accounting change," he said.

"This favorable trend is expected to continue in the third and fourth quarters."

Mini Firm Sees New End User

By Esther Surden

Of the CW Staff

NEW YORK — A new type of end user is emerging, according to William R. Doniger, executive vice-president of Mini-Computer Systems, Inc. of Elmsford, N.Y.

"What customers like the American Stock Exchange, Continental Can, Consolidated Foods, New York Telephone and Shell of Canada represent is an end user buying systems for which we don't have application software responsibility," Doniger said.

Minicomputer Systems, which supplies what it calls Micos systems based on Data General Corp. Novas and its own operating system, plans to open up to six locations for sales and service in the next year, he said.

"Our market is 70% to the OEM user,

20% to turnkey systems sales and 10% miscellaneous," Doniger said.

The OEM users are systems houses, service bureaus, time-sharing facilities and large corporations doing their own applications programming, he added.

The percentage should shift 5% to 10% in favor of the turnkey market, he continued.

Three Configurations

The firm's Micos systems are sold as stand-alone turnkey systems; as a central Micos system with satellite units around it, allowing Micos-to-Micos communications; and as satellite systems which communicate via remote job entry to a large IBM or Honeywell mainframe, he said.

"What we see developing is a central Micos system with small data collection systems at retail outlets to allow the users to enter orders, do some editing, access data and batch back to a central system," he added.

"This is a potentially good market for us," he said.

With the Micos system "we can put 320M bytes of storage on-line using four 80M-byte Control Data Corp. modules on our own MCS controller," Doniger said.

With the advent of the Data General Nova 3 with the MAP memory management feature, the firm feels it can put many terminals on-line, making the distributed processing marketplace a ripe target, Doniger added.

"We are also trying to develop our turnkey market so we have off-the-shelf products for specific industries," he added.

The firm is developing industry-specific applications packages for the clothing and chemical industries.

Rapid Growth Seen

"We feel we now have a stable proven company, with over 250 Micos systems installed, and that growth will continue to be rapid," Doniger said.

"Our business is 100% commercially oriented. The operating system, hardware and research and development is geared toward further sales to the commercial marketplace," he said.

Continued growth is expected because "there is now recognition on the part of major companies that what we install can do more for them than the more experienced manufacturers," he added.

Competition for the Micos system comes from Burroughs, IBM and NCR with "Microdata in direct competition," Doniger said.

The firm handles its own maintenance out of its Elmsford, Atlanta, Anaheim, Calif. and Canada offices but farms out some when the user is too far away.

"The solution is to handle the hardware, software and maintenance," he said.

"One of our major objectives is to be able to do this," he added, explaining the firm plans to open additional offices in the coming year.

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Joint-Venture Printer Maker Stressing Life-Cycle Costs in Product Planning

By Molly Upton
Of the CW Staff

ROCHESTER, N.Y. — Computer Peripherals, Inc. (CPI) is placing increasing emphasis on the life-cycle cost of printers in its new product planning, according to several executives of the joint-venture firm here.

Factors in the cost of a printer include not only the front-end acquisition price, but also maintenance, operator attention and consumption of ribbons and paper.

CPI supplies the printer needs of its three owners, Control Data Corp., NCR Corp. and International Computers Ltd. (ICL), as well as OEM and end-user markets through CDC's programs in these areas, according to Steve Fry, CPI planning consultant.

Products range from a 55 line/min matrix printer and 200- to 600 line/min drum printers, to the Fastrain, a 2,000 line/min unit.

Attention to Support

Harrison Craig, OEM sales manager for CDC, explained that with the increasing difficulty of gaining a unique design advantage, there is more attention on the convenience and support aspects of a product.



CW Photos by M. Upton

Harrison Craig

a mobile van in the Boston area, where there are numerous installations.

The firm is also working on consistent "out-of-the-box quality," where products do not require any adjustment on installation. He compared this to the appliance industry, where consumers expect washing machines to work when they're delivered.

Another step being taken is to develop ways of holding down the skill level for people maintaining and operating printers.

Craig said he feels the OEMs currently are not paying much attention to the demands of users, but that eventually user needs will be reflected in their products.

Users are concerned about paper costs and the amount of paper consumed as well as ribbon expenses and the amount of operator attention, he said.

"Very few attempts have been made to quantify the life-cycle cost," he said.

Increased Testing

Ken Staugaard, CPI manager of product management, described what he called CPI's "invisible layer of value added" through increased testing to assure product reliability.

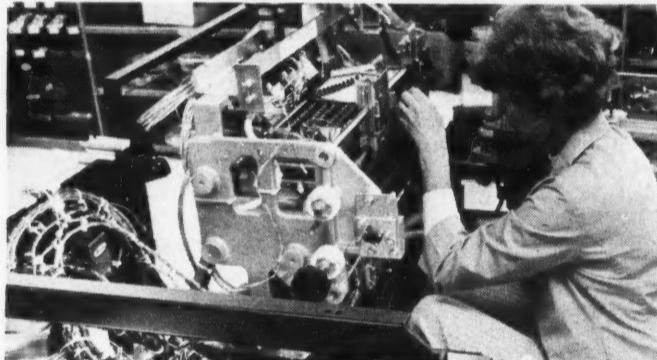
Exposing logic PC boards to thermal shock has reduced the failure rate from between 6% and 7% to .5%, he said.

In addition, CPI puts its first article through a 200- to 400-hour worst-case environment. This includes simultaneous exposure to simulated high altitude conditions, high temperatures and high voltage frequency at 6 to 10 times accelerated usage.

CPI also puts the subassemblies at their minimum and maximum margin assembly limits and runs them at 6 to 10 times the accelerated usage, he said.

Many of the individual parts are burned in, such as needle printer heads, hammer banks and hammer driver PC boards, he said.

Through these tests, CPI knows



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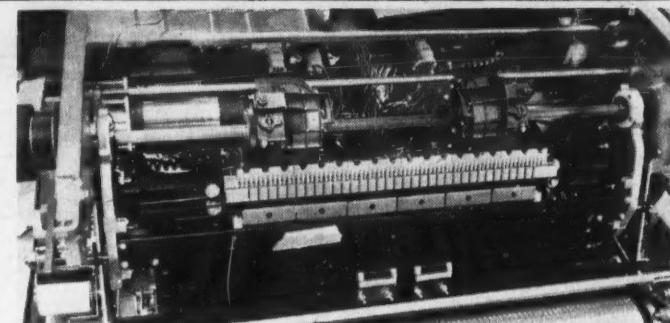
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THE PERKIN-ELMER CORP., Main Ave., Norwalk, Conn. 06856, a scientific instrumentation manufacturer, filed to register 1,545,950 shares of common. It is offering 1,351,152 shares in exchange for all outstanding shares of common of Data Pathing, Inc., Sunnyvale, Calif., at the rate of .4078 NCR share for each Data Pathing share. Also included are 124,954 and 69,853 shares of NCR common, which are issuable upon the exercise of outstanding stock options and warrants of Data Pathing respectively. No underwriter is involved.



CPI drum printer provides example of time-sharing components, such as the hammer banks, each of which handles more than one row of type on the drum.



Technician aligns Fastrain's train gate with hammer bank on as many as five planes.

what the warranty costs should be and these are coming in pretty close, he said.

Don Swatik, manager of engineering, said the primary motivation in product development is cost, which includes the factors of operational costs.

He said he thinks there will be more interchangeable fonts and larger character sets throughout various models of printers.

With the trend from mechanical to electromechanical components, it is becoming easier to monitor performance and there is greater capability in machines for self-diagnosis, Swatik said.

In its trend toward parts commonality throughout its products, CPI units are time-sharing components. By putting high-quality hammers in its medium-speed printers, it can have a hammer every two or three positions rather than every single position, he said.

Future products will be more modular, he said, in order to accommodate flexibility and field-upgradability.

For instance, as modularity increases, it is easier to accommodate the demands by CDC, NCR and ICL for their particular mar-

kets, he said.

The Rochester unit makes line printers and is chartered for both impact and nonimpact printers. However, Craig said he doesn't see the firm making printers whose speed is measured in char./sec rather than line/min.

Shipments of matrix printers have been rising faster than any other segment, he said, and the 300- to 600 line/min units have also been growing, he said.

However, the Fastrain business has been relatively static, according to Staugaard.

The firm recently shipped its 1,000th Fastrain since the product's inception in January 1974.

CPI was formed in order to allow for larger potential resources in product development, Fry said. For example, CPI is receiving more R&D than any of the parties gave before to printer efforts, but this represents a smaller percentage from them than before.

The firm's intent is to provide 100% commonality in mechanical components and 60% to 80% commonality in electrical components, with one test-and-evaluation cycle, Fry said.

Singer Selling N.M. Plant to DEC

ALBUQUERQUE, N.M. — Singer Co. said it has agreed to sell its 325,000-sq-ft plant here to Digital Equipment Corp. The plant produced point-of-sale

equipment, calculators and other business machines, Singer said.

From July 1, when DEC moves in, until the end of the year, Singer will occupy a portion of the building to fill customer orders and make spare parts, Singer said.

Cogar Corp. will continue to make certain systems products, Singer added.

DEC will use the facility to make CRT terminals. In other expansion moves, a 320,000-sq-ft facility is being finished in Phoenix, where DEC will make printer terminals, as an extension of the Westfield, Mass. unit, a spokesman said.

DEC is also starting up manufacturing operation in Ayr, Scotland, where it will make CPUs and systems.

Other Expansions

Selecterm, Inc. has moved its headquarters and distribution/service center to Wakefield Industrial Center, Wakefield, Mass.

New Registrations

ing stock options granted under the stock option plan of Wangco to be assumed by the Perkin-Elmer merger. No underwriter is involved.

HONEYWELL, INC., Honeywell Plaza, Minneapolis, Minn. 55408, a computer automation firm, filed to register 1,075,432 shares of common, which may be sold from time to time on securities exchanges and in the over-the-counter market at prices and at terms then obtainable, in negotiated transactions or otherwise by or for the account of General Electric Co. No underwriter is involved.

MICRODATA CORP., 17481 Red Hill Ave., Irvine, Calif., a minicomputer firm, filed to register 25,000 shares of common, which may be offered for sale from time to time in the over-the-counter market by a shareholder at prices current at the time of sale. No underwriter is involved.

POSITION ANNOUNCEMENTS

CITY OF LAKE CHARLES, LOUISIANA DATA PROCESSING COORDINATOR/DIRECTOR

The City of Lake Charles Administration is seeking a person with at least three years experience preferably in Municipal Data Processing and knowledge of latest data processing techniques and methodology. This person will initially assume total responsibility for interfacing between the administrative departments and the present Facilities Management System. He/she will also plan, develop, install and head an in-house data processing department in due course. The long range plans call for establishing an Information Management System for the City, with adequate supporting hardware.

Salary is negotiable with good fringe benefits. Lake Charles offers pleasant living conditions at reasonable cost in a medium size southern city with excellent recreational facilities.

Send resume to: The Mayor, City of Lake Charles, P.O. Box 1178, Lake Charles, LA 70601.

INSTRUCTOR

Computer Science and Information Systems, to teach in undergraduate program, mainly core. Masters' required. Reply by May 15 with credentials to:

Dr. John Dalton
Box 620
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DIRECTOR, College Computer Center

The College of the Virgin Islands is seeking a Computer Center Director to direct a new center equipped with an IBM System 3. Will assist the various administrative and academic divisions of the College in the use of the computer.

Candidates should have experience administering a college computer facility and preparing programs for business and academic purposes.

Salary range: \$16,000 to \$18,000 plus air fare and up to \$500 relocation allowance.

Send full resume to: Office of the President, College of the Virgin Islands, St. Thomas, Virgin Islands, 00801.

The College of the Virgin Islands provides an equal opportunity to all applicants.

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Qualifications: A master's degree, instructional classroom experience at the college level, five years of system design and development experience; a PhD is highly desirable. Project management capabilities essential and the ability to communicate effectively in writing and orally. Knowledge of innovative and state-of-the-art data processing techniques and methodologies. Salary: \$25,580-\$30,852. Resumes only, no phone calls please. Contact: Personnel Department, Ref. AD, The California State University and Colleges, Office of the Chancellor, 5670 Wilshire Blvd., Los Angeles, Calif. 90036.

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<p>PROGRAMMING NEW YORK..NEW JERSEY A partial listing of positions currently avail. For details plus additional growth situations contact Paul Torelli-Vice Pres. of Data Processing. (201) 488-1910. Systems/Prog \$20K Knowl DOS/VS, Sysgens + BAL \$16K Prog/Anal ANS/COBOL exp req'd SYS/ANAL \$20K To develop finc'l systems</p> <p>DOUGLAS EDP 387 Main Street Hackensack, N.J. 07601</p>	<p>ACADEMIC SYSTEMS DIRECTOR Under general supervision of Vice Chancellor of Educational Systems, Oregon State System of Higher Education. Staff position beginning 1 July 1976. Responsible for coordinating planning implementation and performance review of academic computing network systems and services in support of the instruction and research programs of the State System. Ph.D. or equivalent in computer-related field. Management experience with demonstrated ability to communicate effectively in public environment. \$24,000 plus liberal fringe benefit. Please send resume; references will be requested. Reply E.R. Krueger, OSSHE, Office of Educational Systems, P.O. Box 3175, Eugene, Oregon 97403. Applications accepted up to postmark date May 15, 1976. Equal Opportunity Employer.</p>	<p>SALES</p> <p>Territorial managers needed for sales of Magnetic Media-Computer Supplies. Key locations available. Golden opportunity for experienced individual. Send resume to:</p> <p>CW Box 4638 797 Washington St. Newton, Mass. 02160</p>	<p>PROGRAMMER/ANALYST A growing computer services company is seeking an experienced person who desires the challenge of working on varied applications as a member of a small team of professionals who are implementing financial and manufacturing systems for client companies. The successful applicant must have a minimum of one year in BAL, a minimum of one year in COBOL, the ability to work with a minimum of supervision, and project manager potential. Excellent salary and benefits. Send resume and professional references to:</p> <p>Clarence N. Dixon, Jr. Director of Projects ARISTA INFORMATION SYSTEMS, INC. P.O. Box 12339 Winston-Salem, N.C. 27107</p>	<p>SOFTWARE BROKER Wanted: Software broker with national reputation to sell current "state of the art" banking software. Send resumes to:</p> <p>CW Box 4642 797 Washington St. Newton, Mass. 02160</p>
<p>PROGRAMMER/ANALYST Union Trust Company, a large commercial bank based in Southern Connecticut, is seeking a Programmer/Analyst for the Technical Support Group.</p> <p>The successful candidate should have at least two years' experience using IBM Assembler language, and have been involved in analysis work for at least one year.</p> <p>Previous experience in MICR processing, teleprocessing, SYSGEN's and a knowledge of COBOL is beneficial but not a requirement.</p> <p>If you are qualified and wish to work for a progressive organization, please send resume to Mrs. von Becker, Union Trust Company, Operations Center, Darien, Ct. 06820.</p> <p>An equal opportunity employer</p>	<p>PRODUCT SUPPORT In Computer Performance Analysis</p> <p>A leader in software measurement products has position available for an individual to assist marketing efforts in the New York area. Proximity to Englewood Cliffs, N.J. office preferred. Knowledge of IBM OS and VS operating systems required. Job involves meet, contact. Minimum 2 years EDP systems experience preferred. Some travel. Please call or submit resume: Mike Brennan.</p> <p>BOOLE & BABBAGE, INC. National Technical Manager 625 North Michigan Ave. Chicago, IL 60611 (312) 337-6617</p>	<p>SALES POSITION Washington, D.C. area</p> <p>Aggressive and Growing International Software Company has immediate opening for Sales Representative (District Manager). We require a sharp, ambitious candidate with successful track record who has sold to large IBM mainframes - preferably software or hardware products. Superb compensation package. Write or call:</p> <p>Dennis Crow National Marketing Mgr. BOOLE & BABBAGE, INC. 850 Stewart Drive Sunnyvale, Calif. 94068 (408) 735-9550</p>	<p>SYSTEMS ANALYSTS PROGRAMMER/ANALYSTS PROGRAMMERS</p> <p>Above positions available to qualified individuals with manufacturing background, IBM 360/40, DOS COBOL, DBOMP; prefer material requirements planning experience, project management and heavy user contact experience. Excellent salary and benefits. Please send resume to:</p> <p>Winston Lau Ingersoll-Rand Company P.O. Box 868 Mocksville, N.C. 27028</p>	<p>PERFORMANCE ANALYST N.E. Industrial seeks tech'l assistance in turning & optimizing its CDC installations. Exp in CDC 7600 or 64 series with SCOPE 2, 1 or 3, 4 required. Position offers growth with Ig stable co. Sal to \$22K (fee pd). Contact Stan Durbas (in confidence).</p> <p>ROBERT HALF PERSONNEL AGENCIES 111 Pearl St. Hartford, Conn. 06103 (203) 278-7170</p> <p>PROGRAMMER/ANALYSTS Our most prestigious international client is looking for individuals with experience in OS/HASP/MVT environment. Positions are at all levels up to \$26K. Degree required. All expenses are assumed by the client company. Please send resume to:</p> <p>Hank Dickens PETE COBB ASSOCIATES P.O. Box 20897 Dallas, Texas 75220</p>
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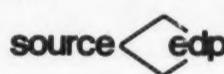
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Honeywell Results Up in First Quarter

MINNEAPOLIS — Honeywell, Inc.'s earnings and revenues for the first quarter improved over those of the year-ago period, although outright sales of computers declined.

Rental and service revenues from its computer business increased 5.9% to \$196.8 million compared with \$185.8 million in

the same period last year.

A continuing trend to lease rather than purchase and continue inflation outside the U.S. adversely affected margins in its computer business, Honeywell said, but added it anticipates improved margins as the year progresses.

Net bookings and shipments in the first quarter were lower than a year ago, but the backlog was higher. Orders for its new mini-computer family are meeting expectations and shipments have begun, the firm said.

Honeywell is also furnishing support and maintenance service to Xerox customers on schedule in most parts of the world, it said.

Translation Helped

Aided by a change in account-

ing for translation of foreign currencies, Honeywell earned nearly \$13.6 million or 68 cents a share compared with a restated \$1.1 million or 5 cents a share in the year-ago period.

As originally stated, the 1975 first-quarter earnings were \$6.1 million.

The 1976 results included \$3.4 million in income from foreign currency translation whereas the restated 1975 figures included a loss of \$6.9 million.

In 1976 there also was a special credit of \$1 million.

The currency gain will be offset in future quarters, Honeywell said, and over the long term the new accounting method should have no significant effect on earnings.

It may, however, make short-

term earnings comparisons less meaningful because of substantial variations from quarter to quarter and year to year, the firm said.

Revenues rose to \$648.4 million compared with \$595.9 million in the same period last year.

The improvement in residential markets and the continued strong performance in sales of controls and services to the commercial building industry were Honeywell's greatest operating strengths in the quarter, the firm said.

Worldwide revenues from divisions serving industrial customers increased over 1975, but the recovery has been much faster in the U.S. than overseas. Aerospace and defense sales are about equal to those of last year, the firm said.

Burroughs Net Climbs 4%

DETROIT — Burroughs Corp.'s earnings climbed 4% on an 11% gain in revenues during the first quarter.

The earnings gain was slightly higher than that predicted earlier by Chairman Ray W. Macdonald, when he warned earnings might barely equal the year-earlier level because of a higher proportion of leased equipment deliveries [CW, April 12].

The high level of leased equipment defers revenue and earnings.

Record Earnings

Earnings rose to a record \$24.3 million or 61 cents a share compared with a restated \$23.4 million or 59 cents a share in the year-ago period.

Revenues reached \$405.3 million compared with \$365.2 million. Rental and service revenues rose 24% while outright sales showed a "slight increase," the firm said.

Incoming orders for the first quarter were up 23% from the year-ago period and backlog rose 11% from the beginning of the year.

"All major product categories and geographic areas showed good increases," according to the company.

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Memorex Scores Its Best Quarter Yet

SANTA CLARA, Calif. — Memorex Corp. reported record quarterly earnings of \$9.1 million or \$1.66 a share compared with \$1.6 million or 36 cents a share in the same period last year.

Revenues rose 29% to \$79.4 million compared with \$61.6 million.

STC Year Rises Despite Write-Off

LOUISVILLE, Colo. — Storage Technology Corp.'s (STC) 1975 earnings climbed despite a \$1.6 million write-off stemming from higher than anticipated start-up costs and scrapped materials in connection with new product introductions.

Earnings rose to \$5.9 million or \$1.40 a share, including a special credit of \$173,000, compared with \$5.4 million or \$1.33 a share in 1974.

Revenues rose 26% to \$98.8

million compared with \$78.3 million last year.

Sales rose to \$66.6 million compared with \$53.7 million while rental and service income reached \$32.2 million compared with \$24.6 million last year.

The first three quarters of 1975 were restated to reflect the write-off. Inventory carrying values were reduced to reflect the write-off of the excess costs, Chairman Jesse I. Aweida said.

Revenues rose 26% to \$98.8

justments and reduced interest expense were also factors, he said.

Breaking down revenues, sales jumped to \$53.8 million from \$35.9 million in the same period last year while rental and service revenues declined slightly to \$25.6 million compared with \$25.7 million in the same 1975 period.

During the quarter, the firm gained \$624,000 from foreign currency adjustments compared with a loss of \$1.3 million in the year-ago period.

Interest expense was almost \$3.2 million compared with nearly \$4.1 million in last year's quarter.

During the quarter the firm repaid \$11 million of senior notes. Cash and short-term investment balances at March 31 were \$37.3 million compared with \$15.9 million a year ago, Memorex said.

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Telex Restructures Loan Financing

TULSA, Okla. — Telex Corp. has restructured its banking arrangements, resulting in expanded domestic line of credit.

Telex said it reduced its bank debt to \$33.9 million as of Dec. 31 through internally generated funds.

Through the restructuring, a six-member domestic bank group led by Continental Illinois National Bank and Trust Co. of Chicago has lent \$17.4 million in term loans payable in install-

ments by March 31, 1980.

Proceeds, along with company funds, were used to full retire \$23.5 million of domestic bank loans outstanding at year-end, the firm said.

The new financing extends to Telex an additional \$7.6 million line of credit renewable annually and expandable to \$20 million in increments equal to reductions in domestic bank term loans in excess of \$5 million.

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Request for Proposal No. 235 for the lease or purchase of a high speed data channel, a disk controller, and one disk drive with a capacity of 100M characters to attach to an existing DEC 1077 computer.

Request for Proposal No. 236 for the lease or purchase of 2 CRT terminals each with an attached printer to interface with a DEC 1077 computer system.

Detailed specifications may be obtained from the CDPA office. The CDPA reserves the right to reject any and all bids and proposals and to waive informality. Clyde P. Ballard, Executive Director, Central Data Processing Authority.

Data 100 Overdrawn; Banks Give Extension

MINNEAPOLIS — Data 100 Corp. has received an extension to May 17 to pay its banks \$5 million, the amount it overdraw beyond its domestic bank credit agreement.

The firm is also renegotiating the terms of its credit arrangements with its banks, Data 100 said.

Since its inception, the company has been short of cash needed to finance the build-up of its lease base, which at year-end had a gross book value of \$51 million, Edward D. Orenstein, Data 100 president noted.

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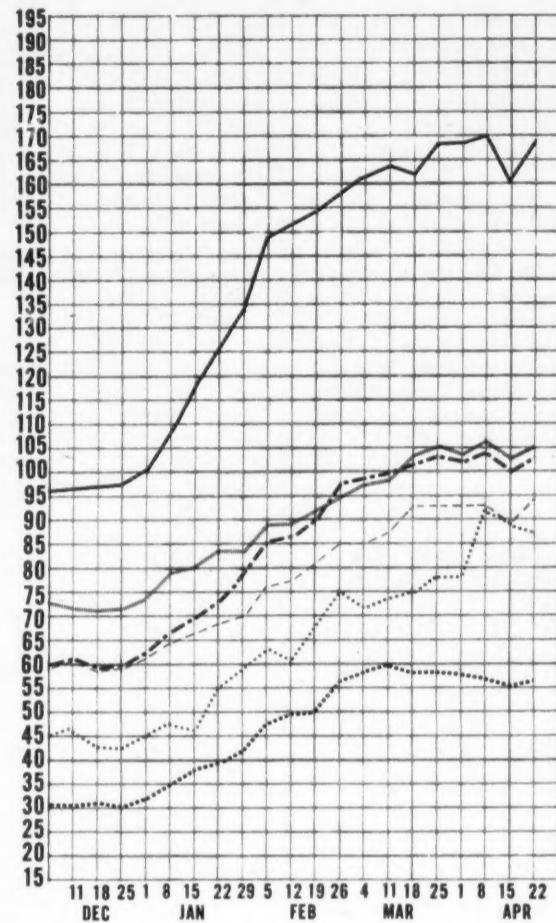
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Computer Systems **Software & EDP Services**
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Supplies & Accessories **CW Composite Index**



Earnings Reports

COMPUTER ELECTION SYSTEMS

	1975	1974
Shr Ernd	\$.14	\$.14
Revenue	1,740,782	1,697,425
Earnings	171,448	165,347
9 Mo Shr	.25	.51
Revenue	4,239,229	5,415,545
Earnings	300,777	584,165

a-Adjusted for a 25% stock dividend paid in July 1975.

INFORMATION INTERNATIONAL
Three Months Ended Jan. 31
1976 1975

	1976	1975
Shr Ernd	\$.17	\$.13
Revenue	3,146,188	2,409,633
Earnings	424,243	320,187
9 Mo Shr	.50	.42
Revenue	9,964,523	7,134,891
Earnings	1,276,601	1,057,627

MICROFORM DATA SYSTEMS
Three Months Ended Jan. 30
1976 1975

	1976	1975
Shr Ernd	\$.07	\$.05
Revenue	4,504,400	4,029,000
Tax Cred	168,300	112,000
Earnings	350,600	233,300
6 Mo Shr	.18	.10
Revenue	10,242,200	7,633,000
Tax Cred	457,200	235,500
Earnings	952,500	490,600

COMPUTER NETWORK
Three Months Ended Dec. 31
1975

	1975	1974
Shr Ernd	\$.29	.
Revenue	1,625,000	\$841,100
Tax Cred	151,000	.
Earnings	333,000	(107,000)
9 Mo Shr	.95	.
Revenue	5,275,000	2,600,300
Tax Cred	521,000	.
Earnings	1,099,000	(289,600)

GREYHOUND COMPUTER

	Year Ended Dec. 31	
	a1975	1974
Shr Ernd	\$.16	\$.22
Revenue	61,363,000	52,128,000
Earnings	687,000	b952,000
3 Mo Shr	.09
Revenue	14,951,000	12,423,000
Earnings	386,000	(128,000)

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Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, APRIL 21, 1976

All statistics compiled,
computed and formatted by
TRADE★QUOTES, INC.
Cambridge, Mass. 02139

PRICE		PRICE		PRICE														
		RANGE	CLOSE	WEEK	WEEK	RANGE	CLOSE	WEEK	WEEK	RANGE	CLOSE	WEEK	WEEK					
F	X	X	X	X	X	X	X	X	X	X	X	X	X					
C	C	(1)	1976	CHNGE	CHNGE	H	(1)	1976	CHNGE	CHNGE	H	(1)	1976	CHNGE				
COMPUTER SYSTEMS																		
N BURRIGH'S CORP	62-109	107	5/8	+4	1/2	+4.3	O ADVANCED COMP TECH	1-	?	1	5/8	+3/4	+85.7					
O COMPUTER AUTOMATION	7-19	17	1/2	+1	1/2	+9.3	A APPLIED DATA RES.	1-	10	2	3/4	+1/2	+22.2					
N CONTROL DATA CORP	11- 27	24	5/8	+1	3/8	+5.9	N AUTOMATIC DATA PROC	29-	65	64	5/8	+3	7/8	+6.3				
N DATA GENERAL CORP	10- 60	60	1/2	+5	1/2	+9.5	B BRANDON APPLIED SYST	1-	1	1	1/8	0	0.0	0.0				
O DATACPOINT CORP	6- 39	37	3/4	+1	3/4	+4.8	O COLEMAN AMERICAN COS	4-	6	4	1/8	0	0.0	0.0				
O DIGITAL COMP CONTROL	1- 4	3	0	0	0	O COMPUTER DIMENSIONS	2-	7	7	0	+1/4	+3.7	0.0					
D DIGITAL EQUIPMENT	44-181	191	1/4	+7	3/4	+4.4	O COMPUTER ELECTION SYSTEMS	3-	7	6	1/4	+1/2	+8.6					
N ELECTRONIC ASSOC.	2- 5	3	3/4	-	1/8	-3.2	O COMPUTER HORIZONS	1-	1	1	3/4	0	0.0	0.0				
A ELECTRONIC ENGINEER.	5- 16	15	7/8	+3	1/4	+4.9	O COMPUTER NETWORK	1-	6	5	3/8	-	1/8	-2.2				
M EXYARD	23- 42	36	1/2	+2	1/4	+6.6	O COMPUTER SCIENCES	2-	9	6	1/2	0	0.0	0.0				
G GENERAL AUTOMATION	4- 14	11	1/8	+1	7/8	+20.2	O COMPUTER TASK GROUP	1-	1	1	0	0.0	0.0	0.0				
O GPT COMPUTER CORP	1- 1	3	3/4	0	0	O COMPUTER USAGE	2-	6	3	1/2	-	1/4	-6.6					
N HEWLETT-PACKARD CO	59-120	116	1/2	+2	5/8	+2.3	O COMSHARE	2-	4	4	1/4	+1/2	+13.3					
N HEWFIELD INC	72- 56	47	1/8	+2	1/2	+5.6	O DATATAR	1-	2	7/8	0	0.0	0.0					
N IBM	154-272	251	1/2	+5	+	+1.0	A FLECT COMP PROG	1-	1	1	1/8	0	0.0	0.0				
O MANAGEMENT ASSIST	1- 3	2	1/2	+1	1/2	+25.0	N ELECTRONIC DATA SYS.	11-	29	13	3/8	+3/4	+5.9					
O MERCURY	1- 33	32	1/2	+4	3/4	+17.7	O INTERNATIONAL INC	1-	1	1	1/8	0	0.0	0.0				
O MICRODATA CORP	2- 26	23	1/2	+1	1/4	+5.6	O IPS COMPUTER MARKET.	1-	1	1	-	1/8	-11.1					
O MODULAR COMPUTER SYS	5- 19	9	3/4	+1	1/4	+2.6	O KFANF ASSOCIATES	2-	3	3	1/8	0	0.0	0.0				
N NCR	15- 39	28	1/2	+1	7/8	+7.1	O KEYDATA CORP	2-	5	2	7/8	0	0.0	0.0				
O PRIME COMPUTER INC	2- 11	9	3/4	0	0.0	O LOGICON	3-	5	4	0	0.0	0.0	0.0					
N PDPKIN-FILMER	14- 30	25	1/2	+1	1/8	+4.7	A MANAGEMENT DATA	1-	3	2	1/2	+1/8	+5.2					
N PAYTHEEN CO	26- 50	53	2	+2	1/2	+4.9	N NATIONAL CSS INC	4-	25	20	3/4	+1	1/8	+5.7				
N SPEEDY RAND	26- 50	47	7/8	+1	0	O NATIONAL COMPUTER CO	1-	1	1	1/8	0	0.0	0.0					
O SYCDP INC	5- 31	28	0	+1	1/4	+4.6	O ON LINE SYSTEMS INC	8-	22	19	0	+1	+5.5					
A SYSTEMS ENG. LABS	1- 10	8	7/8	-	1/8	-1.3	N PLANTING RESEARCH	2-	6	3	3/4	+1/2	+15.3					
N VARTAN ASSOCIATES	7- 19	15	5/8	+1	0	O PROGRAMMING & SYS	1-	1	1	1/2	0	0.0	0.0					
A XANG LABS.	7- 20	13	3/4	-	1/4	-1.8	O RADITRONIC INC	2-	5	3	3/8	+1/8	+3.8					
LEASING COMPANIES																		
O COMMISCO INC	1- 10	8	1/4	-	1/8	-1.4	O REYNOLDS & REYNOLD	10-	24	17	3/4	+3/4	+4.4					
A COMMERCIAL GROUP CORP	2- 4	2	1/2	+1	1/8	+5.2	O SCIENTIFIC COMPUTERS	1-	1	3/4	0	0.0	0.0					
A COMPUTER INVESTORS CORP	1- 3	2	0	0	0.0	O SIMPLICITY COMPUTER	1-	1	1	0	0.0	0.0						
M DATRONIC RENTAL	0- 1	3/4	0	+1	1/8	+20.0	O TYNSHAPTE INC	7-	28	25	5/8	+3	1/8	+13.8				
O DDFC INC	0- 1	5/8	-	1/8	-15.3	A UPS SYSTEMS	2-	5	3	3/4	+1/4	+7.1						
N DDFC INC	3- 7	6	0	0.0	N WATLY CORP	2-	7	5	+1/2	+11.1	0.0	0.0						
O END RESOURCES	1- 2	1	0	0.0	PERIPHERALS & SUBSYSTEMS													
A GREYHOUND COMPUTER	2- 5	4	7/8	+3	3/8	+8.3	N ADDRESSOGRAPH-MULTI	4-	13	10	+5/8	+6.6	0.0	0.0				
N ITTEL	3- 13	12	5/8	+1	1/8	+1.0	O ADVANCED MEMORY SYS	1-	10	8	-1/4	-3.0	0.0	0.0				
N LFASPC CORP	4- 14	12	3/4	+3/4	0	+6.2	N AMPLEX CORP	3-	9	7	1/2	+5/8	+9.0					
O IFEASPC CORP	0- 1	1/8	-	1/8	-50.0	O ANDERSON JACOBSON	1-	4	3	+1/4	+9.0	0.0	0.0					
O ILLICOT MGT INC	1- 1	1/9	0	0	0.0	O BEEMIVE MEDICAL ELEC	1-	5	4	5/8	-	2.6						
O NRG INC	0- 4	7/8	0	0	0.0	A BOLT, BERANEK & NEW	5-	13	7	7/8	0	0.0						
A PIONEER TEX CORP	2- 9	7	1/4	-	1/8	+6.2	O BUNKER-RAMO	4-	9	6	+3/8	+6.6						
A ROCKWOOD COMPUTER	1- 1	1/8	0	0	0.0	A CAICOMP	3-	7	5	1/8	0	0.0						
N U.S. LEASING	7- 14	11	1/8	+1	1/2	+4.7	N CAMBRIDGE MEMORIES	1-	6	4	3/8	-	2.7					
SUPPLIES & ACCESSORIES																		
O ADVANCED SYSTEMS INC	1-	4	3	1/2	0	N CENTRONICS DATA COMP	7-	35	33	1/8	+2	1/8	+6.8					
O BALTIMORE BUS FORMS	4-	5	4	1/2	0	N CENTRONIC CORP	15-	42	38	+2	+5.5	0.0	0.0					
A GARRY NIGHT	5-	10	8	1/2	0	O CECATRONICS	1-	2	1	1/8	-1/8	-10.0						
O CYBERMATICS INC	0-	1	5/8	0	0.0	O COMPUTER COMMUN.	1-	4	4	1/2	0	0.0						
A DATA DOCUMENTS	20-	42	36	3/8	0	O COMPUTER CONSULES	3-	7	6	+1/4	+4.3	0.0						
O DUPLEX PRODUCTS INC	12-	25	19	0	0.0	O COMPUTER EQUIPMENT	1-	3	2	0	-16.6	0.0						
N ENNIS BUS. FORMS	5-	8	6	3/4	+1/2	O COMPUTER TRANSCEIVER	0-	9	7	1/8	+1.6	0.0						
O GRAHAM MAGNETICS	5-	13	11	3/4	+1	O CENTRA	2-	9	7	7/8	+1/8	+1.6						
O GRAPHIC CONTROLS	8-	21	16	3/4	+1/2	O CENTRAC CORP	12-	30	24	+2	+9.0	0.0						
N 3M COMPANY	43-	69	63	1/2	+1	O STANDARD REGISTER	11-	20	17	1/4	+1	+5.8						
O MCNEIL CORP LTD	39-	51	47	3/4	+1/2	O TAB PRODUCTS CO	4-	9	7	0	+1	+7.6						
N NASHUA CORP	9-	22	15	1/4	0	O VANTEX GRAPHICS CORP	17-	25	24	1/2	0	0.0						
O WAAGO INC	4-	22	20	1/4	+1	O WABASH MAGNETICS	4-	8	7	1/8	-	-1.7						
O WILTEK INC	1-	4	2	0	0.0	N WALLACE BUS FORMS	15-	25	22	1/4	+1	+0.5						

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